



Clean Water Fund: Keeping Minnesota Healthy



A Minnesota Department of Health Five Year Progress Report
2010 - 2014



Executive Summary

An extraordinary call from the citizens of Minnesota to protect drinking water is prominent in the Constitutional Amendment ballot language of November 2008:

“Shall the Minnesota Constitution be amended to dedicate funding **to protect our drinking water sources**; to protect, enhance, and restore our wetlands, prairies, forests, and fish, game, and wildlife habitat; to preserve our arts and cultural heritage; to support our parks and trails; and to protect, enhance, and restore our lakes, rivers, streams, and groundwater by increasing the sales and use tax rate beginning July 1, 2009, by three-eighths of one percent on taxable sales until the year 2034?”

The resounding “yes” in the affirmation of the amendment expresses the aspirations of Minnesotans for safe and sufficient drinking water for all. Minnesotans clearly expressed their desire to protect drinking water now and for 25 years into the future in their support of the Clean Water, Land, and Legacy Amendment. As Minnesota’s lead public health agency, the Minnesota Department of Health (MDH) protects, maintains, and improves the health of all Minnesotans. MDH’s existing programs that protect drinking water have been enhanced by several new initiatives during the first five years of Amendment funding:

- advancing health-based guidance for drinking water contaminants that raise new concerns for human health,
- improving well information sharing and access by enhancing the online County Well Index,
- increasing knowledge of the potential health risks associated with microbes (bacteria and viruses) in groundwater and water reuse settings,
- monitoring recreational beaches along Lake Superior for unsafe levels of bacteria and preventing disease outbreak by providing public notice,
- increasing knowledge of the occurrence and distribution of arsenic in private drinking water wells in order to improve and target guidance to those at high risk,
- reducing groundwater contamination by sealing unused wells through a cost-sharing program, and
- increasing the number of communities receiving technical and/or financial assistance for developing and implementing source water protection plans.

The intent of this report is to describe the progress of the Clean Water Fund initiatives for protecting our drinking water at MDH during the first five years.

Contaminants of Emerging Concern Program

Scientists able to develop guidance of particular interest to Minnesota

MDH guidance poised to prevent potential health threats of emerging contaminants

The Minnesota Department of Health (MDH) is often questioned about the safety of drinking water that may be contaminated with chemicals or harmful microbes. Often, those contaminants are from products or sources we never suspected in places we never expected, including our lakes, rivers, and drinking water. The Contaminants of Emerging Concern (CEC) Program is staffed by health scientists who develop health-based drinking water guidance that is used by communities, water suppliers, and state regulators to determine if contaminants in drinking water are posing a risk to human health. Substances that have been evaluated over the past five years include medications such as triclosan, chemicals such as fire retardants used in common household products, pesticides and pesticide break down products such as chlorpyrifos oxon, and industrial chemicals.

The CEC Program reviews toxicity and exposure information for emerging contaminants in a context specific to Minnesota. In 2012, a plant in Luverne, Minnesota became the first in the United States to convert from producing ethanol to producing isobutanol. Isobutanol is a second generation biofuel similar to ethanol that can be mixed with gasoline at a higher proportion than ethanol. The potential for significant growth in the isobutanol industry brings with it the unfortunate potential for spills or leaks that could release isobutanol into the environment and into our groundwater, posing potential health risks for Minnesotans drinking contaminated water. Understanding the possibility of environmental release and drinking water contamination, the CEC program determined a guidance value of 300 parts per billion (ppb) for isobutanol in drinking water.

Isobutanol has not been found in Minnesota drinking water at levels higher than 300 ppb, which

is not surprising given the currently small size of the industry. As the isobutanol industry grows in Minnesota, MDH is poised to provide information on the potential impacts to human health based on the guidance development process carried out by the CEC Program.

The CEC Program develops health-based guidance to proactively protect drinking water and the Minnesotans who rely on it in their homes, schools, and workplaces every day. In addition, the CEC program carries out special projects that provide a more holistic understanding of emerging contaminants in our environment and their impact on our health. Special projects include education and outreach grants, development of rapid assessment methods for pesticides and pharmaceuticals, and investigating quantitative microbial risk in a water reuse setting.

Outcomes

- Of 75 nominated contaminants, 66 have been screened for inclusion in the CEC Program and 23 have completed guidance values.
- The CEC Program has provided \$199,575 in education and outreach grants to seven local units of government or water education and advocacy organizations.
- CEC Program staff have developed rapid assessment methods for pesticides and pharmaceuticals. Recommendations are in development for 154 pesticides and over 150 pharmaceuticals.

County Well Index Enhancement Project

Improving well data information sharing and access

Turning user feedback into tangible improvements

The County Well Index (CWI) is the principal source of well construction and associated geologic information for the state of Minnesota. CWI is the basis for most of the geologic and groundwater mapping and assessment in Minnesota and is vitally important to the work of well contractors, water planning engineers, and agencies such as the Metropolitan Council, Minnesota Department of Natural Resources (DNR), Minnesota Pollution Control Agency (MPCA), Minnesota Geological Survey (MGS), and the U.S. Geological Survey (USGS). When reliance on outdated technology threatened CWI, the state legislature provided funding through the Clean Water Fund to enhance the database and online application.

Described by well contractors as “critical to our industry” and by a regional planning agency as a “vitally important tool” in groundwater modeling, the value of CWI is clear but enhancements were necessary to keep it operating as intended and to make it a more effective tool. Focus groups in 2008 helped the Minnesota Department of Health (MDH) gather input on improving the information included in CWI and the interpretation of that information. In 2012, MDH held external stakeholder meetings with representatives from drilling contractors, consultants, local and state government agencies, and other interested parties who use the CWI program. A similar meeting was held with MDH staff. Users and contributors of CWI data recommended making data sets more accessible and usable and to improve locational information about wells.

The County Well Index Enhancement Project is updating and expanding CWI's capacity to support groundwater protection and prevent threats to drinking water supplies. The updated CWI will be able to support future enhancements.

Over 100,000 backlogged well records have been entered into the database. In addition, updates to the web interface will make more information available, such as water quality results and scanned well records. Well contractors use the information in CWI to provide the most accurate information to prospective well owners on the area geology, water levels, and total depth—all of which can impact the cost of installing a well for a landowner. The web interface updates will allow users to search for information in a variety of ways, making record searches more efficient and complete.

An online entry application will be developed to allow well contractors to enter records, pay fees, and update well records. A corresponding mobile application will be developed to allow accurate location information to be captured in the well record using GPS/GIS standards.

Outcomes

- The elimination of a large backlog (over 100,000) of well records.
- An updated online County Well Index Search system.
- Expanded information available to well contractors, engineers, local governments, regional planners, and state agencies through the County Well Index.
- A user-friendly online application for well contractors to submit and manage well information.
- An online system and companion mobile application for pinpointing and submitting well locations.

Groundwater Virus Monitoring Study

Understanding risks of viral illness from drinking water

Monitoring study and epidemiological study to provide big picture view of microbial risk

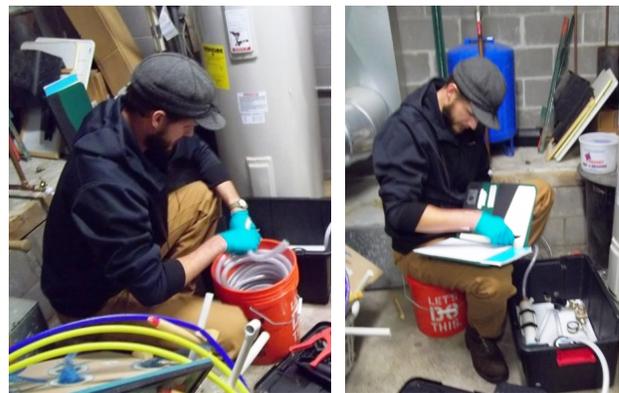
Outbreaks of waterborne viral illness have been associated with groundwater sources used as drinking water. National surveys show that about 30 percent of drinking water wells may be contaminated with viruses that can make people sick. But which viruses are actually in Minnesota's groundwater? In what amounts or concentrations? Are these viruses making Minnesotans sick? These are some of the questions the Minnesota Department of Health (MDH) is attempting to answer through its Groundwater Virus Monitoring Study.

Reducing acute microbial risk and exposure through drinking water sources is a public health priority. The Minnesota Legislature in 2013 asked MDH to develop and implement a groundwater virus monitoring plan and to study how groundwater virus concentrations are related to community illness rates.

The Groundwater Virus Monitoring Study project has two parts: a two-phased Monitoring Study and a Community Illness Study. Phase I of the Monitoring Study will sample groundwater supplies for illness-causing viruses and compare Minnesota occurrence rates with national findings. This work started in May 2014, sampling 82 randomly selected non-disinfecting groundwater supplies to assess virus occurrence and to evaluate modeling tools for predicting virus occurrence. Phase II will include sampling targeted sources to evaluate viruses as a way to assess groundwater contamination. Sample and data collection efforts will center on viruses found in the human intestinal tract, microbes and chemicals that can provide more information about water quality and the possibility of contamination, and information about the well construction. As part of this work, MDH will determine if factors such as compliance with the Minnesota Well Code, management practices for contaminant sources, and unique climatic or

geologic factors might lead to differences in the rate at which viruses occur in drinking water sources.

The Community Illness Study will evaluate the association between source water virus occurrence and the rate of acute gastrointestinal illness in communities. Data from this study will help MDH determine if virus contamination presents a human health risk in Minnesota. Information gathered in both studies will allow us to develop and improve health-based guidance tools to reduce the public health risk from viruses in groundwater drinking water sources in Minnesota.



Groundwater Virus Monitoring Study field work.

Outcomes

- A description of virus occurrence in Minnesota groundwater.
- An assessment of various factors (Groundwater Assessment Tool) that can predict virus occurrence.
- An archive of 1,300 virus samples for future investigations.
- A better understanding of the fate and transport of viruses in groundwater.
- Policies and guidance to manage viruses in groundwater and improve public health protection.

Lake Superior Beach Monitoring Program

Gastrointestinal illness is no day at the beach

Beach monitoring keeps Lake Superior visitors healthy

Every year, thousands of people, tourists and residents alike, visit Minnesota's beautiful Lake Superior North Shore, from Duluth to Grand Portage, to take in its breathtaking views and enjoy its sparkling clear-blue waters for some of the finest recreational opportunities anywhere. Access to these opportunities was a key factor in Duluth recently being voted the top city in the U.S. for an active, outdoor lifestyle.

Those who use the Lake Superior waters for boating, kayaking, angling, and yes, even swimming, expect to go home with plenty of memorable experiences. But no one expects to go home with gastrointestinal illness or any other disease from contaminated water. To limit the chances of that happening, the Minnesota Department of Health's (MDH) Lake Superior Beach Monitoring and Notification Program tests recreational beach water and notifies the public if bacteria levels pose unsafe health risks to users.

While instances of unsafe levels are rare compared to the number of user-days during a season, contamination of Minnesota's coastal recreational waters can occur from a wide variety of natural and human activity, including urban rainwater runoff, wastewater collection and treatment facility overflows, failing on-site wastewater treatment systems, discharge from boats, animal feeding operations and pet and wildlife waste.

When sampling by the beach monitoring program indicates unsafe levels of contaminants at a beach, signs advising "no water contact" are posted until further sampling indicates no health risk. The public is further notified through the program's website and area media.

The Lake Superior Beach Monitoring Program monitors 40 of the 80 public beaches along

Minnesota's 154 miles of Lake Superior shoreline. Water off those beaches is sampled at least one time per week for water contaminants that could make beach-goers sick. This monitoring provides critical information about Lake Superior water quality and allows MDH to notify visitors of potential risks. Beach-goers can take advantage of resources such as the mnbeaches.org website to check the status of their favorite beach before leaving home.

Besides the daily monitoring and notification activities, program activities include beach assessment data analysis, management and reports, improved outreach efforts through public information needs assessment, exploration of new monitoring technologies, and sanitary surveys that identify pollution sources. Monitoring data and sanitary surveys conducted at these Lake Superior beaches will be used to explore the use of predictive models to forecast beach water quality, furthering the ability to protect public health.

The Lake Superior Beach Monitoring and Notification Program draws on partnerships with various government agencies, academic institutions, and county health departments.

Outcomes

- Sanitary surveys at 40 Lake Superior beaches.
- Assessment of usefulness of combining sanitary survey information with monitoring data to explore predictive models as a method of forecasting beach water quality before samples are collected.

Private Well Protection Arsenic Study

Study seeks to refine well testing methods

Improving accuracy of arsenic measurements keeps private well owners and their families healthy

Given arsenic's poisonous reputation, many Minnesotans are surprised to learn they may have it in their well water. Arsenic can be found in groundwater just about anywhere in Minnesota, but has no taste and no odor. Testing is the only way to know whether or not a well has arsenic in it. The Minnesota Department of Health (MDH) recommends testing private drinking water wells at least once for arsenic, and all new wells must be tested before being placed in service. Because a drinking water well might only be tested for arsenic once, it is very important that the arsenic test be accurate.

The MDH Well Management program is leading the Private Well Protection Arsenic Study to determine which water sampling techniques, such as collection methods and timing, provide the most accurate measure of arsenic in new private wells. The study includes samples from 250 newly-constructed private wells in areas of northwestern, northeastern, and central Minnesota that have widespread occurrence of elevated arsenic. Wells are sampled using water sampling methods common among well contractors. Sampling began in June 2014 and will continue through the end of 2015. Wells will be resampled once after 3-6 months and again 12 months later to track variation over time. The initial sample at well construction can be significantly different than subsequent well samples as the groundwater chemistry stabilizes from the well construction process.

Approximately 10 percent of new wells in Minnesota contain arsenic above the drinking water standard. Private well water with high levels of arsenic may be harmful for well owners' health. Although arsenic concentrations seem low and may not pose an immediate health risk, over time arsenic accumulates in the body and causes a number of health problems,

including nervous system problems, skin disorders, high blood pressure, and reduced intelligence in children. Studies have also linked long-term exposure to arsenic in drinking water to increased risk of cancer of the bladder, lungs, liver, and other organs.



MDH staff takes a water sample at a newly constructed well.

Outcomes

- Of 250 wells, 130 have been sampled (as of December 2014).
- Guidance will be provided to well contractors on well design that minimizes arsenic in new wells and for best-practices in collecting water samples that provides a true representation of long-term arsenic levels in the new well.
- We will gain a better understanding of the occurrence and distribution of arsenic in groundwater through analysis of geologic, geochemical, statistical, and temporal factors.
- The results can assist private well owners' understanding of arsenic levels in their drinking water, associated health risks, importance of regular well testing, and consideration of water treatment, if needed.

Sealing Unused Drinking Water Wells

Sealing an unused well at the Marshall Processing Plant

Proper well sealing improves water availability to a region

By the time an improperly sealed well at the Marshall Processing Plant was brought to the attention of the Minnesota Department of Health (MDH), the 435 foot deep well was discharging over 50 gallons of groundwater a minute into the Redwood River via a storm sewer. The free-flowing (artesian) well was drilled in 1955, but when the plant closed in the 1970s, the well was sealed by inserting lumber and burlap as a support structure for nine feet of concrete poured into the top of the well casing. The concrete plug stopped the flow from the well for a period of time, but eventually the steel casing corroded and the well began to flow again.

Unused wells that are not sealed properly can become a source of groundwater contamination and affect nearby drinking water wells that are still in use. MDH's Well Management Section ensures the proper sealing of wells that are no longer in use to protect both public health and Minnesota's invaluable groundwater resources. When the city of Marshall planned street reconstruction in the area of the unused Marshall Processing Plant well, MDH was able to provide funding to assist the city to seal the well during street reconstruction. Funding for well sealing is provided to well owners at a 50 percent cost-share assistance for unused private and public water supply wells.

This one improperly sealed well was wasting over 26 million gallons of groundwater every year. Groundwater is the main source of drinking water for three out of every four Minnesotans. In the Marshall area, as well as other areas of Minnesota, cities, industries, and rural water providers are looking for additional water supplies. Sealing unused wells helps maintain adequate water availability in the region and prevent contamination from reaching groundwater supplies.



Removing debris from the Marshall Processing Plant well in preparation for sealing.

Outcomes

- Fiscal Year 2012: \$174,468 was granted to nine local governments and 171 private wells were sealed.
- Fiscal Year 2013: \$266,865 was granted to 18 public well owners and 26 public wells were sealed.
- Fiscal Year 2014: \$290,000 was made available to ten local governments and an estimated 170 private wells were sealed.

Source Water Protection Planning and Grants

Source water protection grant paves way for water partnership

Cold Spring reduces nitrogen fertilizer use; improves vital community relationships

When the city of Cold Spring saw elevated levels of nitrate in their drinking water, they knew they needed to take action to reduce it. Nitrate, a common groundwater contaminant in Minnesota, can enter drinking water supplies from nitrogen-fertilized crop fields, feedlots, wastewater, or landfills. At high levels, nitrate poses a special health risk for infants and, in extreme cases, can be fatal.

Cold Spring worked with local landowners to reduce nitrogen fertilizer applications in an effort to further protect their drinking water. Partners in source water protection included area farmers, residents, the Minnesota Department of Health (MDH), the Minnesota Department of Agriculture, Minnesota Rural Water Association, Stearns County, and the Natural Resource Conservation Service. Source water is the water in streams, rivers, lakes, and underground aquifers that Minnesotans use for drinking water.

The city purchased nitrogen-inhibitor products from the local co-op. These products help farm fields use nitrogen fertilizers more efficiently. As a result, farmers were able to reduce the amount of nitrogen fertilizer applied to their fields by 4,100 pounds of nitrogen applied over 277 acres. Cold Spring installed four monitoring wells and is working with MDH to measure the effectiveness of the nitrogen fertilizer reduction efforts to maintain safe drinking water for the area's 3,850 residents.

Beyond reducing the amount of nitrogen fertilizer applied, the partnership has improved vital relationships. Despite a history of strained relationships, this project increased trust and cooperation between the city and local farmers and landowners. All city residents are getting the opportunity to cooperate and participate by learning about the importance of responsible turf management

to alleviate the nitrate loading that may affect public water supply wells.

The goal of source water protection activities at MDH is to prevent contamination before it enters the streams, rivers, lakes, and aquifers that serve as sources of drinking water. The Source Water Protection Planning initiative accelerates the number of communities like Cold Spring that MDH assists with the development and implementation of source water protection plans.

MDH also provides grants to encourage implementation of source water protection activities of enduring value. Grant dollars have been used across the state to remove potential sources of contamination, seal unused wells, install alternate emergency power systems, conduct community outreach, and other activities.

Outcomes

- Expanded ability to deliver technical assistance to local units of government has resulted in over 350 approved source water protection plans.
- Source water protection grants have provided direct financial support to 261 public water suppliers to protect and safeguard their local drinking water supplies, totaling over 1.5 million dollars.

Financial Summary

Clean Water Fund dollars protect our waters and our health

Healthy people in healthy communities depend on a safe and abundant supply of drinking water and clean water for recreation. Support from the Clean Water Fund allows public health programs at the Minnesota Department of Health (MDH) to expand on existing activities and enhance prevention and protection efforts for the future.

Legislative appropriations from the Clean Water Fund to MDH

MDH Initiative <i>(in thousands)</i>	FY 10-11	FY 12-13	FY 14-15	TOTAL
Contaminants of Emerging Concern	\$ 1,335	\$ 2,040	\$ 2,300	\$ 5,675
Accelerated Source Water Protection	\$ 2,415	\$ 2,830	\$ 3,230	\$ 8,475
Well Sealing, Private and Public	\$ -	\$ 500	\$ 500	\$ 1,000
County Well Index Enhancement	\$ -	\$ 668	\$ 780	\$ 1,448
Private Well Study	\$ -	\$ -	\$ 650	\$ 650
Groundwater Virus Monitoring	\$ -	\$ -	\$ 1,600	\$ 1,600
Lake Superior Beach Monitoring	\$ -	\$ -	\$ 210	\$ 210
Total	\$ 3,750	\$ 6,038	\$ 9,570	\$ 19,358

MDH initiatives also use Clean Water Fund dollars to fund grants, contracts, and activities across the state. Funds for well sealing, for example, pass through MDH to public water suppliers and local governments to take actions to either seal public wells or encourage private well owners to seal unused wells. Nearly \$200,000 in grants from the Contaminants of Emerging Concern program were provided to non-profit organizations or local governments to plan or develop innovative outreach and educational projects that engage the public in learning about contaminants, sources, and actions they can take to reduce the impact of contaminants on our drinking water.

Almost half of the dollars appropriated to the Source Water Protection initiative are awarded to public water suppliers to take actions to protect the source of their drinking water. These grants are used statewide to install emergency power systems, conduct community outreach, locate potential contamination sources, and improve security.

When possible, Clean Water Fund dollars are used to leverage other financial resources. Well sealing grants require a 50/50 cost share. Two of the three types of source water protection grants require matching funds; grants awarded from MDH totaled \$989,383 and the cost match from recipients was almost double that amount at \$1,798,427.

To sum up, wise stewardship of Clean Water Fund dollars matched with strategic programming focused on measurable outcomes is making a difference in protecting the sources of Minnesota's drinking water.

Conclusion

In 2008, Minnesotans' support of the Clean Water, Land, and Legacy Amendment clearly showed the value of water resources and a renewed commitment to protecting drinking water. Together with other Executive Branch agencies and a multitude of local partners, the Minnesota Department of Health (MDH) is diligently working to provide a clean water legacy for future Minnesotans. Funding through the Clean Water Fund has allowed MDH to be proactive in protecting drinking water, which supports the department's mission of protecting, maintaining, and improving the health of all Minnesotans. As we continue this important work, the Clean Water Fund has given MDH opportunities for long-term planning that allow us to use the available resources effectively and sustainably to make a difference.

Activities in the first five years have:

- improved our ability to gather and share important information about drinking water wells in Minnesota,
- expanded our knowledge about potential health risks from chemicals, disease-causing microbes, and naturally occurring elements, and
- increased our ability to assist communities in protecting their drinking water for current residents and future generations.

Minnesota is fortunate to have relatively abundant sources of clean drinking water and MDH is committed to maintaining and protecting those resources. In the future, MDH is looking toward more holistic approaches to protecting drinking water and aligning with broader water resource management efforts to provide multiple benefits. MDH will continue to use funds provided by the Clean Water Fund to achieve goals that ensure Minnesotans and visitors have access to clean and safe water for drinking, recreation, home use, and more, including:

- focusing on private well protection for the one million Minnesotans who get their drinking water from a private well,
- exploring non-drinking water exposures to harmful contaminants and microbes that could have health impacts, such as water reuse and beach monitoring programs, and
- increasing our education and outreach efforts to empower Minnesotans to take action to protect their drinking water.

Minnesotans use water every day in their homes, on their farm fields, in their businesses, and as a part of their recreation. Partnerships that include state agencies, federal agencies, non-governmental organizations, local units of government, and proactive citizens are essential to ensuring safe and reliable water for future generations. The funds provided by the Clean Water, Land, and Legacy Amendment make this collaborative work possible.



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