



Date: April 19, 2013
To: Water Utility Board
From: Joseph Grande, Water Quality Manager
Subject: **Wellhead Protection Planning and Implementation**

The Wisconsin Department of Natural Resources requires an approved Wellhead Protection Plan before any new water source goes into service. This requirement applies to any well constructed after 1992 and applied to Madison wells #28, #29, and #30. The department also recommends that municipalities develop and implement wellhead protection plans for existing water sources. Furthermore, the Water Utility was directed by the previous mayor to complete a wellhead protection plan for every Madison well. A total of seventeen plans have been completed and approved by the DNR while the remaining five plans are 50% to 95% complete. The utility anticipates completing these final five plans by the fall.

Previously, development of and updates to the wellhead protection plans were the responsibility of the Engineering section. In 2012, these tasks transitioned to the Water Quality section. A new position of Water Quality Program Specialist was created to lead the effort to complete the remaining plans, begin the updates of previously completed plans, continue implementation of the management strategies identified in the plans, and develop and implement an education and outreach program for wellhead protection. The utility is in the final stages of filling this position.

Among the first tasks that will be assigned to this individual is the timely completion of the remaining wellhead protection plans. The five final plans are expected to be completed by year's end. Then, beginning in 2014, updates to the existing wellhead protection plans will be initiated. The updates will include using the newly revised Dane County Groundwater Flow Model to re-delineate zones of capture around each well, updating the inventory of potential contaminant sources within a one-mile radius of each well, and revising and implementing the management strategies. Below is a five-year schedule for updating the existing plans. Subsequent revisions to wellhead protection plans will include an update of the contaminant source inventory (CSI) on a five-year rotation.

2013 – 5 original plans to be completed

2014 – 7 updated plans (original CSI completed December 2001 – March 2005)

2015 – 4 updated plans (original CSI completed April 2007)

2016 – 4 updated plans (original CSI completed November 2010 – October 2011)

2017 – 4 updated plans (original CSI completed December 2010 – December 2011)

2018 – 3 updated plans (original CSI completed December 2009 – April 2013)

The contaminant source inventory is an important tool for documenting historic spills and remediation of soil and groundwater contamination proximal to drinking water wells. It also identifies future threats to drinking water quality from existing sources of potential contaminant. However, the muscle behind a wellhead protection plan rests in implementation of management strategies, namely land use controls.

Madison General Ordinances Chapter 28 (Zoning Code) establishes wellhead protection districts around each well encompassing the five-year zone of capture and a minimum 1200-foot radius. Within these protected areas, certain land use activities (i.e. dry cleaner or gasoline station) are outright prohibited or conditional use may be approved. Any land use change proposed within the wellhead protection district must be approved by the water utility. Review of proposed uses are based on the presence, storage, or use of hazardous chemicals with consideration given to how the hazardous chemicals will be stored or contained and the magnitude and/or frequency of use. Lawful uses existing at the time the wellhead protection district was created may be continued but may not be expanded or enlarged without Water Utility approval. For example, a gasoline filling station is located on a parcel directly adjacent to a well on Mineral Point Road. Nineteen of Madison's wellhead protection districts were established in 2007 and 2008. Four other districts were established between 2002 and 2004.

Plan review for development proposed to be located within a wellhead protection district is conducted by senior engineering staff. The water quality section is occasionally contacted directly by a contractor when a revised plan calls for the installation of auxiliary power supply and fuel storage. The inquiry is often intended to determine the distance from the nearest public water supply well which may affect tank construction and secondary containment requirements.

One subject which has garnered considerable attention of late is the installation of geothermal wells in wellhead protection areas. Such installations require approval by the Department of Natural Resources. As part of the permitting process, DNR requires that owners or their agents contact the municipality to see if additional local permits are required or if the installation falls within a wellhead protection area. The City of Madison currently does not require a permit since the well does not meet the definition of MGO 13.21 (3). Further, plan review is based on the use of hazardous chemicals. Propylene glycol, a common coolant in geothermal installations, is a non-toxic, food-grade material. Finally, the drilling and installation of a deep closed-loop, underground network involves some risk of temporarily disturbing the aquifer and promoting the movement of drilling mud or aquifer solids towards the municipal well. Once installed, though, geothermal wells present minimal, if any, risk to drinking water quality.

In the case of the University Crossing installation, the developer performed a test bore and committed to remaining above the Eau Claire shale. The developer further agreed to provide as-built drawings that identify precisely the locations of the boreholes and committed to using propylene glycol as the coolant. Following discussion of the subject at a recent Water Quality Technical Advisory Committee, the city or utility might consider requiring a hydrogeological investigation to assess the risk of groundwater impacts or water quality monitoring during future installations in wellhead protection areas.

Finally, one program success over the last few years has been stepped up activities to identify and seal improperly abandoned private wells. Since 2010, this program has resulted in the closure of nearly 170 wells in the City of Madison. As of December, 124 reimbursement requests have been submitted for a total payout of \$41,368.90. Comprehensive surveys have been conducted in the wellhead districts of wells #6, #7, #9, #14, and #15. To date, 2378 external and 718 internal surveys have been conducted primarily by a fifty-percent LTE technical aide. A permanent full-time administrative clerk assists with scheduling and record-keeping.