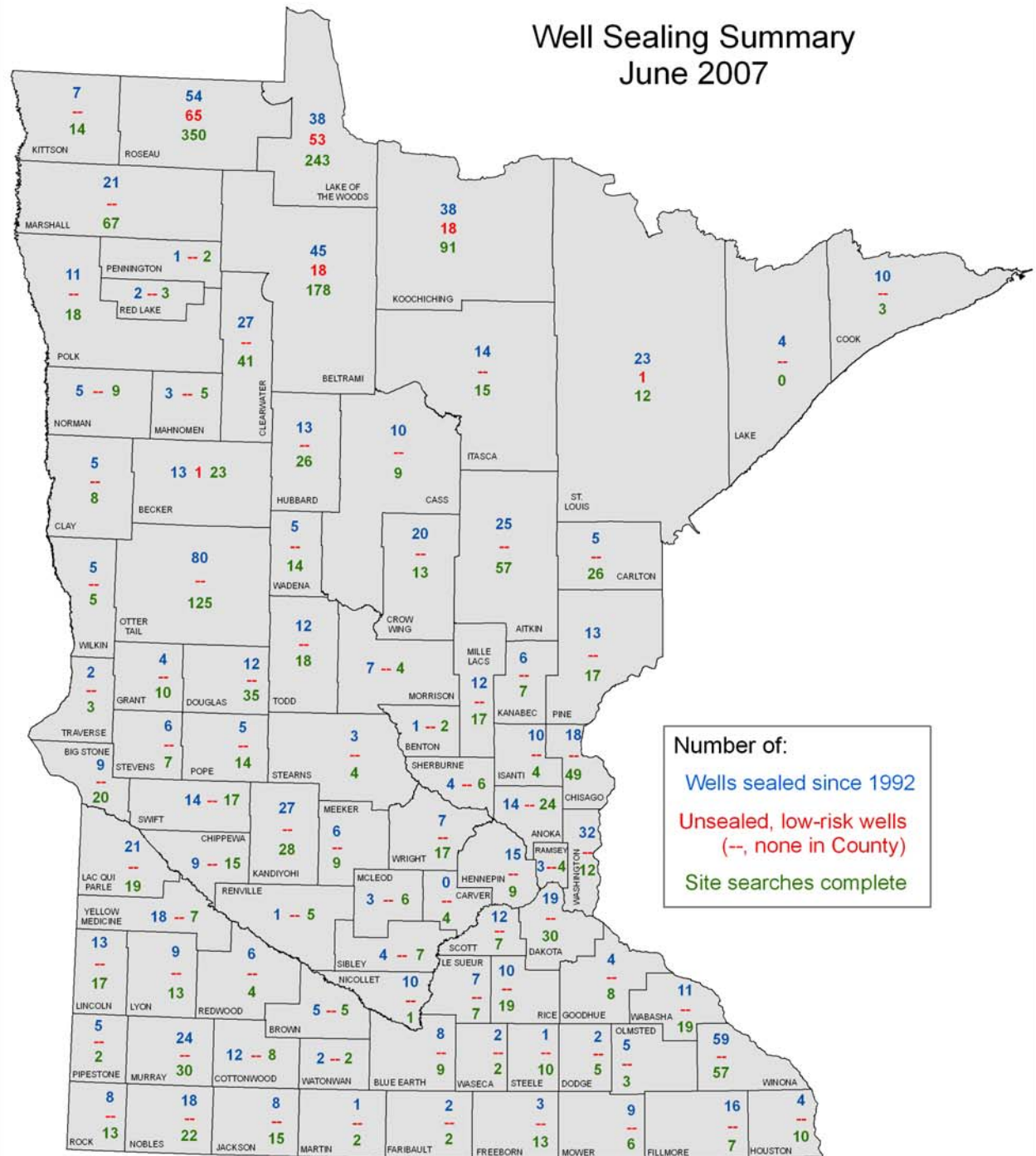


Final Status Report of Well Sealing on State Land



**DNR Waters
2007**

Well Sealing Summary June 2007



Number of:
 Wells sealed since 1992
 Unsealed, low-risk wells
 (--, none in County)
 Site searches complete

Summary map of well sealing activity

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Background

The Minnesota Department of Natural Resources (DNR) has completed a program to locate and seal abandoned wells on state-owned land. The 1989 Minnesota Ground Water Protection Act required the DNR to locate wells on state land and to permanently seal them. Several units within the DNR had begun to address the issue with limited funds before this coordinated and comprehensive project began. In fiscal year 1995–1996, the Minnesota legislature allocated bonding money to start this work, and the work was continued with additional appropriations in 1997 and 2001. Costs to seal individual wells have ranged from \$300 to \$39,000 with an average cost of \$1000–\$1500 for each well. The total cost to seal all wells since fiscal year 1995–1996 has been \$2,522,000.

The DNR administers more than 5 million acres of land. This is 95 percent of the state-managed land in Minnesota or approximately 10 percent of the state's entire land area. Many of the wildlife management areas, state forests, and state parks were farmsteads that the DNR acquired before well sealing regulations were established. After acquiring the farmsteads, the DNR usually demolished or burned the buildings, often without having the wells properly sealed. After the well sealing program was initiated, these sites were systematically searched for abandoned wells (Figure 1). If a well was found, it was sealed by a licensed contractor, returned to service, or left unsealed in rare circumstances. Wells were not sealed if they were considered a very low risk to ground-water contamination and were located in areas where road or access to the well site had been destroyed. When new land is acquired now, current regulations require abandoned wells to be sealed as part of the land transaction.



Figure 1. The windmill and open, rusty well casing (shown the by arrow) mark this abandoned well. This is a potential access point for contaminants.

In addition to sealing wells on state-managed land, the DNR contacted the regional treatment centers operated by the Minnesota Department of Human Services. Working with treatment center staff, the DNR located and sealed abandoned wells on land administered by the treatment centers at locations such as Anoka and Willmar.

Unused and abandoned water wells were cited as a threat to Minnesota's ground-water quality in the 1989 Minnesota Ground Water Protection Act. Forgotten, deteriorating wells are a liability because of their potential to connect contaminants at the ground surface directly to underlying aquifers. This happens when wells are improperly dismantled or destroyed, and when the well



Figure 2. Looking down from above at the well casings and pump rod that have to be removed from the well before the well is sealed against contaminants.

to state recreational areas (Figure 3). Animals or the unwary public can easily stumble into these open-holed structures that typically are covered by native vegetation that has grown undisturbed for years. These open-holed structures were filled as part of the well sealing effort. Consequently, the well sealing program has also contributed to the long-term physical management of state lands by locating and removing structures that could threaten the safety of the public.

Investigation and Well Sealing Process

The investigation and well sealing process included locating and sealing both visible wells and suspected sites of buried wells on abandoned farmsteads. Many visible wells on state land were known by the local DNR land managers, and well sealing staff simply had to coordinate the proper sealing of these wells. However, locating suspected sites of buried wells offered a significantly greater challenge. In general, the investigation process consisted of the following steps:

- The investigation process began by reviewing information on abandoned farmsteads and possible well sites that had been identified by respective DNR land unit managers (from Wildlife, Parks, Trails and Waterways, scientific and natural areas, and Forestry). This information generally identified the approximate location of an abandoned well or a farmstead of a well.

casings begin to corrode and crumble from age (Figure 2). Surface runoff can then drain directly through the well into the aquifer, bypassing the natural filtration that normally occurs when surface water slowly percolates through the soil to the aquifer. A rapid transfer of surface water to the aquifer greatly increases the likelihood that natural or anthropogenic contaminants will be introduced into the ground-water system. One of the key strategies of the 1989 Minnesota Ground Water Protection Act is to protect ground-water quality by preventing its contamination, and this is exactly what the well sealing program has done.

Many of the abandoned wells, such as dug wells, cisterns, and well pits, pose a physical hazard to wildlife and unsuspecting visitors



Figure 3. An uncovered dug well on an abandoned farmstead. Lined by stone, bricks, or concrete, well holes can be 3 feet to 10 feet in diameter and excavated below the water table. A dug well without a cover presents a hazard for humans and animals and a water contamination risk.

- The next step was to compare historical county plat maps with current DNR property boundary delineations. Abandoned farmsteads that appeared on the historical plat maps were added to the list of sites to search.
- After the abandoned farmstead locations were compiled, historical aerial photographs of each site were examined to determine where the farm buildings might have been located on the farmstead. The buried wells were likely located near the farm buildings.
- Before initiating the site survey, the DNR unit managers were contacted for information regarding possible well locations and access to sites. If the previous owners of farmsteads could be found, they were also contacted for any information about well locations.
- The site survey consisted of systematically walking across and examining the ground where the house and barn likely were located. If no visual evidence of the well was found, the well sealing staff then used magnetometers to survey the site for electromagnetic anomalies indicating the location of a steel-cased well. If anomalies were detected that had the characteristics of a well, a contractor was hired to search for buried well casings by digging in the area of the anomalies. Whether a search located a well or not, staff members continued searching the farmstead to ensure there was not more than one well on a property.
- If a well was found, a licensed well sealing contractor was hired to seal the well in accordance with the requirements of the Minnesota Department of Health.
- The well sealing program used global positioning system (GPS) technology to mark the locations of all active, inactive, and sealed wells for subsequent retrieval and use by state property managers.

Data Storage

Hard copies of well sealing records are filed with the DNR, Division of Waters (DNR Waters). The file includes a manila folder for every county generally separating the data into four files: active wells, sealed wells, sites where no well was located, and background maps. The exceptions to the county files are state parks that have their own folders. Most field notes were collected in orange field books (similar to a surveyor's field book), and these are stored separately under the name of the staff person completing the search. A summary of all wells and sites searched is also stored electronically in a computer database managed by the Bureau of Management Resources. The files now stored by DNR Waters will be transferred to the Facility Section of the Bureau of Management Resources since that entity is responsible for the ongoing management of DNR wells.

Accomplishments and Discussions

The summary map of well sealing activity (page 2, inside the front cover) lists the number of wells sealed and sites searched in each county. Table 1 below lists the number of wells by well type and well sites identified in the computer database. The category "sealed wells" includes 185 wells in the initial well inventory completed in 1992, 1077 wells sealed with bonding money, and 113 wells sealed as part of the day-to-day operation of DNR-managed land since 1992 for a total of 1375 wells. The "unsealed, low-risk wells" category represents wells left unsealed because the cost required to access these remote sites with well sealing equipment is much greater than the possible risk to the public associated with these sites. In addition, the natural appearance and wilderness qualities for some of these areas may be compromised by tree cutting or adding temporary roads to reach the site. Most of these sites were located in the northern Minnesota counties of Roseau, Beltrami, Lake of the Woods, and Koochiching. The sites in the category "site not accessible—not searched" were not searched for similar reasons noted for the unsealed,

low-risk wells. The sites in “well suspected but not excavated” were not excavated because they occur in historic or environmentally sensitive areas.

Table 1. Surveyed Wells and Abandoned Homesteads.

<u>Category</u>	<u>Number</u>
Active wells	639
Sealed wells	1375
Unsealed, low-risk wells	160
Site not accessible—not searched	52
Well suspected but not excavated	12
Abandoned homesteads searched	2105

Conclusions

The DNR has completed the well sealing project using all reasonable methods for locating wells on state land. Additionally, the DNR has systematically searched more than 2100 sites for abandoned wells. The most valuable benefit of the program has been the sealing of nearly 1400 wells to prevent contaminants from migrating into ground water through deteriorating well casings and protecting the citizens of Minnesota from the physical danger of old, open wells. A secondary benefit has been the increased awareness of DNR staff to the difficulties resulting from any delay to sealing wells. Adding to the expense of sealing wells in this program were the many staff hours required to locate abandoned wells; the difficulty of onsite searches because the buildings on these sites were often razed nearly 50 years ago, the access roads were destroyed or eroded, and the well sites commonly were overgrown with trees; and the cost to redrill or extract debris from long-abandoned wells. A final critical benefit of the program is that the DNR Bureau of Management Resources now has an active database to track wells.

Contact

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