Retired Minnesota Department of Health (MDH), well program employees Ed Ross and Jim Nye were recently spotted at the Minnesota Ground Water Association’s 2015 Spring Conference on Ground Water Sustainability. Both continue to remain interested and active in groundwater and public health issues.

Ed Ross is responsible for establishing the first statewide well contractor licensing program and well code in Minnesota. He championed proper well construction, recognizing the benefits to the public, the environment, and the well industry. Ed was instrumental in many groundwater contamination and water-supply investigations including the creosote contamination problem in St. Louis Park, Minnesota, and the unique water supply concerns in the karst areas of southeastern Minnesota.

Jim Nye was a former manager of MDH’s Well Management Unit. Some of Jim’s many accomplishments include identifying and addressing the problems caused by multi-aquifer wells, and developing a nationally recognized program of education, well sealing cost share, well disclosure at the time of property transfer, and regulations to seal old unused wells to prevent contamination of our groundwater aquifers and to protect public health and safety.

Ed and Jim are true “Pioneers” of the groundwater protection movement and paved the way for many of us in the industry today. We owe them a debt of gratitude! Many thanks to Ed and Jim for leading the way!

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Boil Water Advisory at Blue Waters Mobile Home Park

In early July 2015, routine testing of water from the drinking water distribution system at the Blue Waters Mobile Home Park in Lindstrom, Minnesota, by the Minnesota Department of Health (MDH), revealed the presence of *E. coli* bacteria. Follow-up water samples were collected and were also positive for *E. coli* bacteria. On July 10, 2015, mobile home park officials implemented a boil water advisory for its 150 residents. The park is served by a community public water-supply well that was constructed in 1996, is 183 feet deep, and is completed in a glacial sand aquifer.

Community public water supplies are regulated by the Safe Drinking Water Act. MDH periodically tests the water from these systems to assure that the water is safe for consumption. When *E. coli* bacteria are detected in a community public water supply, a boil water advisory must be implemented, and an inspection of the well and water system must be conducted to determine the likely source of the bacteria. Then, if necessary, any repairs must be made and the well and distribution system must be thoroughly cleaned and disinfected. The boil water advisory may not be lifted until retesting of the water shows that bacteria are no longer present in the system.

The route through which the bacteria likely entered this well was thought to be a broken electrical conduit pipe where it connected to the well cap. Openings such as this can allow insects, mice, and other rodents entry into a well and that may be what caused the contamination. The boil water order was in effect for 19 days. Mobile home park officials provided bottled water to the residents as an alternative to boiling water. Bottled water was used extensively by the residents. The boil water order was lifted on July 29, 2015, after the conduit pipe was replaced and the well and distribution system were thoroughly cleaned, disinfected for one week, then flushed for several days by Salverda Well Company from Forest Lake, Minnesota. A mobile home park official confirmed that insects were observed being flushed from the well during repair operations. Follow-up water sampling by MDH has confirmed that coliform bacteria are no longer present in the well and water distribution system.

This case highlights the importance of an insect and vermin-proof watertight well cap with a screened vent and a protective electrical conduit with a sealed connection to the well cap. Fortunately, this contamination incident was caught in time and there were no reports of illness associated with consuming water from the well.

Obstructed Wells can be Difficult to Clear and Expensive to Seal

When junk, garbage, and other assorted debris is dropped down an open, unsealed well, it can really complicate the well sealing process and significantly increase well sealing costs. This was exactly the case in June 2015 when Lawrence “Butch” Miggler, owner of Miggler Well Drilling Company, St. Paul, Minnesota, was hired to permanently seal an old, unsealed residential water-supply well at a home that was for sale in Maplewood, Minnesota. The 4-inch diameter well was located in a basement offset well.
room. The well likely failed in 1965, when the home was connected to the municipal water system. The pump had been removed and the well was open and unsealed. Over the years, the open well was used as a waste receptacle to dispose of debris. Minnesota rules require that all debris that will interfere with well sealing must be removed from the well prior to well sealing.

It didn’t take long for Butch to figure out that this would not be an easy well to seal. A quick look with his well inspection camera revealed a beer can obstructing the well at the depth of 35 feet. He made up a custom fishing tool and retrieved the beer can, and then he removed another, and another, and another . . . until he had 18 beer cans, of various brands, removed from the well. Then it got more difficult as he found the well was plugged with additional debris that was not as easy to remove. Butch used several fishing tools, some that he fabricated onsite along with other manufactured tools including a threaded taper-tap and threaded overshot tap, an assortment of drill bits, a magnet, and an air compressor that he used to blow smaller pieces of debris out of the well.

After working to clear the well for parts of five days, he finally got it cleaned out to the bottom so that it could be properly sealed. Some of the identifiable objects removed from the well included 18 beer cans, a kick stand and wheel axle from a bicycle, a pair of men’s BVDs, broken glass, a throttle cable from a lawn mower, silverware, coins, rocks, a hammer handle, and two pails of other unidentified debris.

Butch said that he has never seen a well plugged with so much debris since he began working in the well industry in 1962 (53 years ago). He said that the final cost to clear the well and seal it was more than three times what it would have cost if the well had not been obstructed with debris. In addition to the extra cost to seal the well, the closing of the sale of the property was delayed due to the additional time and work necessary to clear the obstructions from the well.
Well Drilling Rig Partially Swallowed by Sinkhole in Florida

On July 23, 2015, a rotary well drilling rig was partially swallowed up by a 30 foot deep sinkhole on a residential property in Citrus County, Florida. The drilling crew, from Citrus Well Drilling and Pump Repair, had driven well casing to the depth of 126 feet and had stepped away from the rig to write down drilling notes when one of the workers notice that the ground was moving near their water truck. They immediately moved the water truck away from the area and before they knew it, the ground opened up under the drill rig and partially swallowed it! Ray Townsend with Citrus Well Drilling and Pump Repair said that, “we have not had any problems with sinkholes in this area in the past.” He also said that, “he was relieved and grateful that nobody was injured during this incident.” The home on the property, which was only 20 feet away from the well site, was not damaged.

Heavy rains in the area complicated efforts to extract the top-head drive, Drillmaster DMAC 1170 rig from the sinkhole. The rig was finally hoisted to safety with the assistance of a crane and an excavator. Damages to the rig were extensive and repair estimates exceeded the value of the rig. It took 32 truckloads of soil to re-fill the sinkhole. After the sinkhole was filled in, Citrus Well Drilling and Repair was able to complete another well on the property, without any problems, approximately 120 feet away from the area where the sinkhole occurred.

In Minnesota, sinkholes primarily occur in the southeastern part of the state and are commonly associated with landscapes that have thin soil layers underlain by limestone bedrock. To learn more about sinkholes and karst regions in Minnesota, and around the world, consider attending the “14th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst,” sponsored by the Minnesota Ground Water Association (MGWA) and the National Cave and Karst Institute (NCKRI), starting on October 5, 2015, in Rochester, Minnesota. See the continuing education calendar in this newsletter, or our website, for details.
Increased Problems Seen with Seasonal Use Wells and Wells Placed into Service before they are “Officially” Completed

The Minnesota Department of Health (MDH) is seeing problems with seasonal use wells and also with wells that are placed into service before they are “officially” completed.

Seasonal use wells are used on a seasonal basis, usually in the warmer months, and then are disconnected in the fall, and then placed back into service in the spring. These wells are typically found on recreational properties including lake and hunting cabins. MDH finds many of these wells out of compliance with sanitary requirements for a variety of reasons including noncomplying well caps, vents, exposed electrical connections, or lack of protective conduit surrounding the electric wires for the pump.

Another class of wells that MDH is seeing similar problems with, are wells that are nearly complete and are placed into service on a temporary basis, in order to provide the well owner with water for a variety of reasons including ongoing construction needs. They are often found at new construction sites. Even though these unfinished wells are only meant to be used for a short period of time, they are often used for much longer than originally intended. This is not an issue if the well is in full compliance with the well code; however, many of these wells are not in compliance due to a variety of well code violations, including those listed above.

Both of these types of wells are usually intended to be used for years to come. For seasonal use wells, if compliance is not achieved from the start, it is unlikely it ever will be achieved. Both types of wells often have an above grade discharge through a sanitary well seal and an outdoor water pressure tank. With the lack of a pitless unit or pitless adapter, many of the wellhead components are exposed to the elements, warranting additional consideration to protect them from the elements and achieve compliance.
Here are some key points to remember to help ensure a safe and sanitary water supply for your customer:

- Only one-piece top plate sanitary well seals are approved for outdoor use.
- Two-piece top plate sanitary well seals are allowed only when inside an approved well house.
- Electrical conduit must be installed and be made watertight and vermin proof on all above grade wiring in accordance with the Minnesota Electrical Code.
- Consider using Minnesota Electrical Code approved, flexible, liquid tight conduit for convenient installation on above grade wiring.
- With a few exceptions such as flowing wells, a vent is required.
- The vent must terminate at least 12 inches above grade and be downturned and screened (<1/16 inch opening).
- Vents can be homemade, but be sure it is made of approved materials meeting casing standards or copper, galvanized steel, cast iron, or plastic pipe meeting the Minnesota Plumbing Code.
- Some planning is required to be able to properly install all of the required components on a sanitary well seal. Remember to allow space to properly install each component, in order to avoid interference with other components.

If you have any questions regarding well code compliance, please contact your local well inspector, well standards representative, or hydrologist. For questions regarding wiring or conduit requirements, please contact the local electrical inspector.

**Well Interference and New Law Regarding Sealing Affected Well**

*(By Carmelita Nelson, DNR Water Conservation Consultant)*

Well interference occurs when the pumping of a high capacity well that has been issued a water appropriation permit by the Minnesota Department of Natural Resources (DNR), adversely affects the pumping or function of another, pre-existing well. In Minnesota, high capacity wells that pump more than 10,000 gallons of water per day, or 1 million gallons per year must have a water appropriation permit from the DNR. Domestic water use is the highest priority for Minnesota’s waters. Well owners who are adversely affected by the pumping of a well that has an appropriation permit may file a formal complaint with the DNR. The DNR will investigate and determine if the complaint is valid. If so, the DNR will instruct the owner of the appropriation permit to modify the amount of water they pump and/or negotiate a settlement for damages with the affected well owner. *Persons who construct a new domestic well near an existing high capacity well that already has an appropriation permit, are responsible for ensuring an adequate domestic water supply. They are not eligible to file a well interference complaint with the DNR.*
Well owners and well contractors should be aware of a new law, **Minnesota Statutes, section 103G.289** that went into effect on July 1, 2015. The law states that the DNR cannot validate a well interference claim if the affected well has been permanently sealed prior to the completion of the DNR’s investigation. If the well is sealed prior to completion of the investigation, the DNR must dismiss the complaint.

Well interference cases typically spike in dry years, but with more high capacity wells being constructed every year, and the increase in water withdrawn from aquifers, interference can occur regardless of weather patterns. Shallower wells are usually impacted first. Depending on the aquifer used, and the location and depth of wells, one well owner may be impacted, but their neighbor may not have a problem. Not all well interference problems are reported to the DNR. Some conflicts are resolved by the parties involved.

### Number of Valid Well Interference Complaints in Minnesota 2012-2015

(Source Minnesota Department of Natural Resources)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Valid Complaints</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>3</td>
</tr>
<tr>
<td>2013</td>
<td>5</td>
</tr>
<tr>
<td>2014</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>2</td>
</tr>
</tbody>
</table>

If a well owner suspects well interference, they can go to the DNR’s Web page [Well Interference Resolution Process](https://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/interference.html); or they may contact their DNR area hydrologist, or Carmelita Nelson at 651-259-5034. The complainant must complete and submit a Water Well Information and Complaint Questionnaire. A licensed well contractor needs to complete Parts B and C of the form and assist with Part D. The DNR’s area hydrologist will review and determine whether an investigation is necessary. As part of the investigation, a DNR groundwater specialist may need to complete an aquifer test or other analysis and compile a report of findings.

If the DNR determines that a well interference complaint is valid, the well owner causing the interference must perform one or more of the following actions within 30 days of notification:

- Accept a modification or restriction of the permit in order to provide the affected well owner with an adequate domestic water supply.
- Negotiate a reasonable agreement with the affected well owner.
- Request a public hearing.

Most well interference complaints are resolved through a settlement process. This may involve modifying or restricting the amount of water pumped by the party causing the interference, covering the cost of lowering or replacing the pump in the affected well; while in other situations it may involve paying the cost to drill a new well, or the cost to connect the affected party to a rural or municipal water supply. Again, the permanent sealing of affected wells needs to wait until the DNR has completed its investigation.
Mineral Exploration Borings

Minnesota Department of Health (MDH) regulates the construction and sealing of exploratory borings. An Exploratory Boring is a boring that is constructed to explore or prospect for oil, natural gas, gemstones, kaolin clay, and metallic minerals. Regulated exploratory borings do not include borings done to locate aggregate, peat deposits, or dimension stone. Exploratory borings are regulated under Minnesota Statutes, chapter 103I (https://www.revisor.mn.gov/statutes/?id=103i) and Minnesota Rules, chapter 4727 (https://www.revisor.mn.gov/rules/?id=4727). The rules regulate the following:

- Licensing of explorers.
- Certification of responsible individuals.
- Registration of drilling machines and hoists.
- Notification, construction, and use of exploratory borings.
- Sealing (temporary and permanent) of exploratory borings.

Construction of exploratory borings in Minnesota has been regulated by MDH since 1980. Minnesota Rules, chapter 4727, was last revised August 25, 2003. This rule is specific to exploratory borings and does not regulate the construction, repair, or sealing of wells or other borings, which are regulated under Minnesota Rules, chapter 4725.

Licensing, Certification, and Registration of Explorers and Equipment

An explorer license issued by MDH is required to construct, repair, or seal an exploratory boring. The construction, maintenance, and sealing of all exploratory borings must be supervised by a certified responsible individual. In order to be a certified responsible individual, an applicant must take and pass an examination, or be licensed by the state of Minnesota as professional engineer or geologist, or be certified by the American Institute of Professional Geologists. While having one of these accreditations enables an applicant to bypass the exam, the applicant must still apply to be certified as a responsible individual.

Under Minnesota Statutes, section 103I.601, subdivision 3, the explorer must also register with the Minnesota Department of Natural Resources (DNR) – Division of Lands and Minerals at least 30 days prior to constructing an exploratory boring. This registration must be renewed annually. The DNR may require a bond, security, or other assurance from the explorer if the DNR has reasonable doubt about the explorer’s financial ability to comply with the requirements of law. Contacts at the DNR can be found at: Division of Lands and Minerals Contacts (www.dnr.state.mn.us/lands_minerals/contacts.html).

Notification of Exploratory Boring

A written notification to drill an exploratory boring is required at least ten days before an exploratory boring is to be drilled. The notification must be submitted to MDH and the DNR. The notification must contain a map showing the location of each proposed boring, the Minnesota Unique Number of each boring, the name and license number of the explorer, the name of the responsible individual, and the name and address of the property owner.

Construction of Exploratory Boring

An exploratory boring must be constructed according to the provisions in Minnesota Rules, chapter 4727 (https://www.revisor.mn.gov/rules/?id=4727). Requirements include the use of approved casing and drilling fluids, proper disposal of drilling materials, proper backfilling of recirculation pits, and monitoring for radioactivity (where appropriate). During the drilling process and until the boring is permanently sealed, an exploratory boring must be constructed and be maintained to prevent the introduction of surface contaminants into the boring, to prevent the passage of water from one aquifer to another and must be covered and protected to prevent vandalism or entry of debris into the boring.
Sealing of Exploratory Borings
Upon completion of an exploratory boring, the boring must be sealed according to the provisions in Minnesota Rules, chapter 4727. The boring must be permanently sealed using approved grouts and methods, or may be temporarily sealed for up to ten years. If the boring is sealed temporarily, it must be properly constructed, covered, and have an approved protective casing installed to prevent vandalism and entry of debris or surface water into the boring.

Upon completion and sealing of the boring, an Exploratory Boring Sealing Report must be completed and submitted to MDH within 30 days. All reports remain on file with MDH.

Mark Hoffman Retires
Mark Hoffman, hydrologist with the Minnesota Department of Health (MDH) Well Management Section, retired from state service on August 25, 2015.

Mark joined the Well Management Section in 1996, and worked in St. Paul, Minnesota. His primary responsibilities were to review monitoring well and vertical geothermal heat exchanger permit applications and issue permits. Mark was also involved with elevator and environmental bore holes, remedial wells, exploratory borings, and monitoring well maintenance permits.

Prior to coming to MDH, Mark worked for the Minnesota Pollution Control Agency (MPCA) for seven years in their Site Assessment Program. He was also the registered monitoring well representative for the MPCA. Before his work at the MPCA, Mark worked with Geotechnical Engineering of Roseville, Minnesota, as a geologist and a driller.

Mark said that he will miss his coworkers at MDH and the contractors, consultants, and customers he served on a day to day basis. He is looking forward to spending more time with his wife, children, and grandchildren. He plans on traveling to warm places in the winter and spending lots of time on the water boating and fishing in the spring and summer. In addition, Mark plans to pursue hobbies including raising quail, making maple syrup, gardening, hunting, and mushroom hunting.

Obituary
Keith Brovold, age 57, Brovold Wells, Inc., Fosston, Minnesota, passed away on Friday, March 27, 2015.

Keith Brovold 1958-2015 Obituary
(www.carlinhoialmen.com/home/index.cfm/obituaries/view/id/3018094)
Continuing Education Calendar

The Internet link to Minnesota Department of Health (MDH), Well Management Section’s, Continuing Education Programs (www.health.state.mn.us/divs/eh/wells/lwcinfo/training.html).

This calendar lists the upcoming continuing education courses that have been approved for renewal of certification for representatives of Minnesota licensed and registered well and boring contractors. The calendar also lists the number of credits available for each course. The calendar is updated monthly and, if you subscribe, you will be notified by email when this page changes (new classes added, changes to existing classes).

For additional information about any of these training opportunities, call the contact person listed for the program of interest. For general information about continuing education, more current CEU listings, or to request approval for other continuing education activities not listed, contact Norm Mofjeld, MDH, Well Management Section at 651-201-4593, or norman.mofjeld@state.mn.us.
Alex Martell Joins Well Management Section

Alex Martell was hired as a hydrologist with the Well Management Section on August 27, 2015, assuming Ed Schneider’s previous role. Alex comes to the Minnesota Department of Health (MDH) from the consulting industry, where he spent a combined five years in California and Minnesota as a field geologist installing deep monitoring and production wells, conducting hydrogeologic investigations, and maintaining remediation systems. In addition to consulting, Alex also spent three years travelling nationally to commission, troubleshoot, and maintain water treatment systems for Tonka Equipment Company, of Plymouth, Minnesota. In his new role in the Well Management Section, Alex will be coordinating the review of variance requests to the Minnesota well and borings rules.

Alex has a Bachelor of Science degree in Geological Engineering from the South Dakota School of Mines and Technology. He and his wife, enjoy spending time outdoors in every season skiing, biking, fishing, hiking, and rock hunting.

New Contractor Certifications

Well Contractor
Anthony Freeman
Freeman Well Drilling
Walker, Minnesota

Monitoring Well Contractor
Mark Osborn
WSB and Associates, Inc.
Rochester, Minnesota

Individual Well Contractor
Eric Mathews
Glencoe, Minnesota

Limited Dewatering Well Contractor
John Williams
Blake Drilling Company, Inc.
Blaine, Minnesota

Limited Pump Installer
Jesse Oothoudt
North Star Well Service, LLC
Little Falls, Minnesota

Explorer
Michael Hendrickson
Afton Minerals, LLC
McGregor, Minnesota

Garret Eliason Johnson
Hibbing Taconite Company
Hibbing, Minnesota

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New Well Management Section Operations Unit Supervisor

Longtime Well Management Section employee and senior hydrologist, Ed Schneider, was promoted to Operations Unit Supervisor on April 15, 2015. Ed replaces his former supervisor, Mike Convery, who retired on March 10, 2015. Ed was originally hired by the Minnesota Department of Health (MDH) in 1985. In 1988, he began working with the Groundwater Quality Control Unit, which has evolved into what is now the Well Management Section. He initially worked as a field hydrologist, later served as a regional supervisor in the Duluth District Office from 1990-1994, and then returned to the twin cities to take on responsibility for coordination of variance reviews, review of municipal well construction plans, and product and material reviews and approvals. Ed brings a wealth of knowledge and expertise to his new position and can be reached at 651-201-4586.