



VOLUME 20 NUMBER 4 MISSOURI DEPARTMENT OF NATURAL RESOURCES FOURTH QUARTER 2013

## Rule Updates

Four Missouri Well Construction Rule amendments are moving through the rulemaking process. Draft rules, if completed, are available on the department's webpage at [dnr.mo.gov/geology/geosrv/geo-rules-in-dev.htm](http://dnr.mo.gov/geology/geosrv/geo-rules-in-dev.htm).

The rulemaking regarding the Disciplinary Action and Appeal Procedures (10 CSR 23-1.075) became effective August 28, 2013. However, the rule also became invalid due to passage of House Bill 28 during the 2013 legislative session. This bill transferred the Well Installation Board's authority to hear contested case appeals to the Administrative Hearing Commission, effective August 28, 2013. At its August 2013 meeting, the board voted to begin the rulemaking process to amend the rule to reflect the change.

The board voted to approve the heat pump rulemaking (10 CSR 23-5.010 – 10 CSR 23-5.080) and move forward with filing with the Secretary of State's Office. Staff will notify all heat pump contractors of the effective date of this rule.

The board also voted to postpone the Continuing Education program rulemaking in lieu of other rules that may be amended in the near future as a result of House Bill 1135. This rule would require permittees to obtain continuing education credits to renew their permit.

Work on Public Well Permit Requirement rulemaking also has been postponed. The proposal will require a "public well permit" to drill or install pumps in public wells.

Questions regarding these rulemakings or the rulemaking process should be directed to Sheri Fry at 573-368-2115.

## House Bill 28 – Missouri Well Construction Rules (10 CSR 23-1.075)

The 2013 legislative session saw the passage of House Bill 28, which amended many of the laws relating to the state's natural resources, including the Water Well Driller's Act. Specifically, changes to Section 256.630, RSMo rendered the Missouri Well Construction Rule on Disciplinary Action and Appeals (10 CSR 23-1.075) invalid.

Section 621.250 of the Revised Statutes of Missouri (RSMo) was amended to include the Water Well Driller's Act, Chapter 256.600 – 256.640. This law now states, "All authority to hear contested case administrative appeals granted in chapters ... 256 ... shall be transferred to the administrative hearing commission.... For appeals pursuant to ... chapter 256 ... the

## Well Installation Board News

The Well Installation Board held its quarterly meeting August 23, 2013, at the Missouri Department of Natural Resources' Southwest Regional Office in Springfield. The board heard several agenda items, most of which required a vote:

- Approved not to change fees for well records and permits for FY 2014.
- Directed staff to begin rulemaking to amend 10 CSR 23-1.075, Disciplinary Action and Appeals Procedures. House Bill 28, which passed during the 2013 legislative session, transferred authority to hear contested case appeals from the board to the Administrative Hearing Commission. Therefore, rule amendments are needed to reflect the change.
- Approved the Final Order of Rulemaking for amendments to 10 CSR 23-5, Heat Pump Construction Code.
- Voted to postpone rulemaking for continuing education requirements. This decision was based on comments received by a survey submitted to nearly 800 businesses with permitted contractors and those attending. This topic generated much discussion, and it was decided that further research was needed before proceeding with rule development.

Additionally, a staff member with the Department's Public Drinking Water Branch gave a presentation regarding available grants for plugging abandoned wells.

The next quarterly meeting is scheduled for 10 a.m., Friday, November 1, 2013, at the Missouri Geological Survey, Mozarkite Conference Room, 111 Fairgrounds Road, in Rolla.

administrative hearing commission shall render a final decision rather than a recommended decision."

Simply put, all appeals will now be heard by the Administrative Hearing Commission, whose decision will be final. Staff have begun a new rulemaking to address these changes. In the interim, the procedure to file an appeal with the Commission may be found online at [moga.mo.gov/statutes/C600-699/6210000250.htm](http://moga.mo.gov/statutes/C600-699/6210000250.htm) (see Section 621.250).

Questions regarding this change should be directed to Sheri Fry at 573-368-2115.

## Monitoring Well Development

When the monitoring well construction regulations within the Missouri Well Construction Rules were revised in 2011, the minimum requirements for monitoring well development were removed.

The main reason for this change is because the amount and type of development required is site- and well-specific, and no one method will be effective for every circumstance. This does not diminish the importance of well development. Proper development is necessary to ensure the free flow of water from the target formation and reduce or eliminate turbidity during sampling. The importance of removing the fines from the vicinity of the well screen cannot be overstated. An article in *National Driller*, (May 3, 2001, Thomas Kwader, P.G. Ph.D.) postulated that in addition to the possibility of artificially elevated concentrations of metals due to high turbidity, should the turbidity also contain organic carbon, falsely elevated volatile organic compound concentrations could occur as well.

Some basics in well development apply to all monitoring wells. The U.S. Environmental Protection Agency (EPA) recognizes four standard development methods (Standard Operating Procedure, SOP #2044).

- Surging involves the raising and lowering of a block or plunger in the well. The resulting motion forces water into and then out of the formation. This loosens and pulls sediment from the formation. Periodically this sediment is removed from the well. The main concerns with this method are the potential to displace the sand pack, air locking, and forcing clay fines into the screen.
- Jetting requires that a small diameter pipe be lowered into the well a few feet above the well screen, and then air or water is injected through the pipe under pressure, so the sediments are forced from the bottom upwards out of the well. The concerns with this method are containerizing the volume of water and sediment produced, altering the hydrochemistry of the formation, and the possibility that the well screen could clog if water or air is accidentally jetted directly into the screen.
- Overpumping involves pumping the well at a rapid rate, drawing the water level in the well as low as possible and then allowing it to recharge. This is repeated until the water being produced is sediment free. Overpumping is considered to be less vigorous in comparison to surging and jetting, and is often the more desirable method.
- Bailing involves the use of a check-valve bailer to remove water from the well. Slower and more labor intensive than some of the other methods, it is most effective in shallow, low recharge wells.

In all cases, detailed well measurements (pH, temperature, specific conductivity, static water level, total depth, etc.) should be documented prior to the development. The well development should begin as soon as is practical after well completion, although SOP #2044 recommends development take place no sooner than 48 hours after the well grouting has been completed when using the more aggressive methods, such as jetting or surging. If additional water must be added to develop the well, the EPA states it is essential that at least five times the amount of water added must be produced from the well in order to ensure all of the injected water is removed from the formation. A full copy of the EPA standard operating procedure # 2044 is available at [dem.ri.gov/pubs/sops/wmsr2044.pdf](http://dem.ri.gov/pubs/sops/wmsr2044.pdf).

## Updates to Wellhead Online Services

Over the last year, the section has been expanding the number of services available online. Online services increase efficiency and convenience for staff, contractors and the general public. Four services currently are available online: permitted contractor search, Well Information Management System (WIMS) search, permit renewal, and form submittal. These services are available at [dnr.mo.gov/mowells/](http://dnr.mo.gov/mowells/).

The permitted contractor and WIMS search can be used by any person. The permitted contractor search primarily is used by landowners to look up contractors in their area. The WIMS search is very useful to both contractors and landowners. It can be used to find a specific well record or to look at all records in an area. This is helpful for contractors bidding a project or for landowners evaluating bids versus other wells in their area. It is also helpful for remediation contractors evaluating groundwater use in an area.

Permit renewal and form submittal are available only to permitted contractors. Once registered, contractors can submit forms and renew permits. Currently, monitoring well certification records, monitoring well abandonment registration forms, and pump records may be submitted online. The monitoring well forms are checked electronically by the system for compliance and will be certified or registered immediately following payment.

Permits, including machine permits for rigs and pump trucks, may be renewed online. Permits may not be renewed if they are more than 60 days before the expiration date, if the contractor has outstanding violations, or if the permit is more than 30 days past the expiration date. (Late fees will be charged for permits renewed up to 30 days past expiration.) Please also note that permits may not be renewed online if changes need to be made such as address, vehicles, etc.

Online submittal of the water well form is anticipated to be available this fall. In addition, the availability of online testing for those seeking restricted permits is in the developmental stages. Please contact staff if you have questions, suggestions or technical problems regarding any online service.

## MoDOT Meetings

Staff from the Wellhead Protection Section met with staff from the Missouri Department of Transportation (MoDOT) Southeast District in Sikeston on August 14, 2013.



The purpose of the meeting was to educate MoDOT staff regarding permitting requirements for well installation and plugging. MoDOT staff often encounter abandoned water or monitoring wells during land acquisition or public rights of way improvement projects and need guidance about properly plugging abandoned wells. Staff also discussed online services provided by the survey, which will help MoDOT personnel locate well records and find permitted contractors in their area to plug wells. The Southeast District covers 25 counties. Wellhead staff members plan to visit each of the seven MoDOT district offices by spring 2014.

## Accounting for Missouri's Water Needs

Missouri is truly blessed with abundant water resources such as large rivers, streams, lakes and high-quality aquifers. However, the quantity of water may not always be adequate to meet demand during times of drought or when conflict arises between competing water uses. In 2012, every county in the state was impacted in some way by drought; a condition that raised awareness of the potential vulnerability to future water supply shortages and the need for long-term water resource assessment and planning.

The Missouri Department of Natural Resources has completed several studies to model the long-term adequacy of drinking water supply reservoirs and groundwater availability throughout the state. In addition, the department has groundwater monitoring capabilities at more than 160 observation wells. These wells help understand the effects of drought and intensified water use on underground aquifers.

While the advances in monitoring and modeling capabilities provide better data for water supply planning and decision making, a gap still exists in understanding how much water is used, from what areas, over what time periods and for what purposes.

Uncertainty about how much water is being used from the available supply is often likened to trying to balance a checkbook without keeping a record of what is being spent. Ultimately, this reality creates a disadvantage for Missouri when competing with other states that administer water rights. These states often require a precise measurement of water use and, therefore, can make a stronger case for water needs during interstate water disputes.

## Continuing Education Survey Results

On July 19, the department mailed a survey to all permitted companies to gauge industry opinion regarding the continuing education proposal that would make continuing education a requirement for permit renewal.

There were 791 surveys mailed (one to each permitted company). Staff received 236 responses (32%).

Question 1:

*How important do you think it is to have a requirement for continuing education for the well drilling industry?*

Very Important .....	49 (20%)
Somewhat Important .....	66 (30%)
Not Important .....	119 (50%)
No Answer.....	2

Question 2:

*Do you support the department beginning rulemaking on a CEU requirement for permit renewal?*

Yes.....	71 (30%)
No.....	161 (69%)
No Answer.....	4 (1%)

The Well Installation Board voted at its quarterly meeting on August 23, 2013, to postpone work on this proposal in lieu of other rulemakings that may be required in the future. Questions regarding this survey or proposed rules should be directed to Sheri Fry at 573-368-2115.

Complete and accurate accounting of water use is a major step toward developing a meaningful assessment of Missouri's current and future water needs. Water use data are collected and analyzed by the Department's Water Resources Center. The Major Water User Law (RSMo 256.400-256.430) requires any entity with the capability to withdraw 70 gallons per minute (100,000 gallons per day) or greater from any water source (surface source or groundwater) to register with the department and report their water use annually.

Water use reporting provides Missouri with critical data for assessing changes and impacts to water resources statewide. Individual water users may benefit from water use reporting by identifying unintended water losses or overuse that result in increased energy use, system maintenance or treatment costs.

In addition, reporting water use helps to document the water needs of users during times of shortage or dispute, or if there comes a time when water use is regulated.

The department does not regulate the amount of water that can be withdrawn for use, and there is no fee for reporting. Water use registration can be completed online, by email, fax or U.S. mail. An extensive effort has been made to facilitate annual major water use registration by upgrading our online system. Registered major water users now have access to their well or intake data as pre-populated fields through the new online system. For additional information or to request reporting forms, call the Water Resources Center at 573-368-2175. To report water use or obtain forms online, and to view real-time stream and groundwater conditions, visit the Water Resources Center's website at [dnr.mo.gov/env/wrc/](http://dnr.mo.gov/env/wrc/).

## Cement Bond Logger

Jim LoCoco with Mt. Sopris Equipment of Denver, Colorado, traveled to Rolla to conduct a two-day training for Geological Survey program staff on a new cement bond logging tool used for investigation of wells and adequacy of the grout seal. The first day of training consisted of operation of the equipment and logging of the test well. The test well was drilled 200 feet and cased to the bottom with steel casing. The casing was grouted using cement pressured from the bottom of the well to approximately 60 feet from ground surface. A 30-foot gravel zone was placed on top of the cement to create a "void" space. Cement grout was then placed on top of the gravel zone using the gravity method. This well specifically was designed for training staff with the cement bond logger. The second day of training covered data interpretation from the logging of the test well. The cement bond logger identified a good cement bond where the grout was pressured, no bond in the gravel zone, and a poor bond where cement grout was gravity grouted. Having known facts about the design of the well to compare the cement bond logger data, with a positive correlation, gives great confidence in the equipment's ability to accurately collect and report data. The cement bond logger will be a valuable investigative tool for problem wells.

## St. Peter Sandstone

*This is the second installment in a series of three articles that describe the geology and mineral resource potential of the St. Peter Sandstone in Missouri. The previous article gave a general introduction to the St. Peter Sandstone and a geologic summary. This article will cover aquifer characteristics and industrial usage. The final article will include mining information and a summarization of recent evaluation findings conducted by the Missouri Geological Survey.*

### Aquifer Characteristics

The St. Peter Sandstone is one of the primary water producing rock formations in the Ozark aquifer system. Its characteristic “saccharoidal” appearance makes it one of the easiest formations to identify when drilling. In the 1800s, it was known as the Saccharoidal sandstone because of its sugar like appearance. The formation is capable of yielding 10 to 50 gallons per minute (gpm) where deep enough in the subsurface to be fully saturated (Miller and Vandike, 1997). Many domestic wells are completed in the St. Peter, and many high-yield public supply wells are cased above the St. Peter to allow it to contribute to the production of the well. According to Miller and Vandike, “Water quality in the St. Peter is generally good. Total dissolved solid content of water from the St. Peter is generally less than from the underlying carbonate rocks, and the water generally contains less calcium and magnesium, thus is ‘soft’ compared to the deeper water.” Miller and Vandike go on to explain that to the north and east of the freshwater-saline water transition zone the formation contains total dissolved solids in excess of 1000 mg/L. Additionally, along the eastern extent of the freshwater-saline water transition zone, there are local occurrences of elevated concentrations of radionuclides.

An estimated two trillion cubic yards of St. Peter Sandstone is present in Missouri. While the math involved in accurately assessing the volume of water the formation holds would likely

consume more space than allowed for this article, one can make a few general assumptions to conclude that of the 208 trillion gallons of water contained in the Ozark Aquifer (Miller and Vandike, 1997), about 40 trillion gallons of water likely is held in the St. Peter Sandstone.

### Industrial Usage

St. Peter Sandstone has been used dominantly for glass manufacturing since first being mined. The high silica content and subsequent lack of impurities make it ideal for use as glass sand. More recently, it is rapidly being utilized as a proppant in hydraulic fracturing to enhance oil and gas extraction. It is employed when a rock formation beneath the surface is hydraulically fractured to create or improve the flow of natural gas and oil. The sand is pumped into the fractures to hold them open, thus increasing the yield that flows or is pumped from wells. St. Peter Sandstone has a myriad other uses, such as foundry sand, a paint additive, an abrasive, filter media in drinking water purification and wastewater treatment, and in the ceramic and chemical industries.

Mining information and recent St. Peter Sandstone resource evaluation findings by the Missouri Geological Survey will be discussed in the next issue of *The Connection*.

Reference used in this article but not used on webpage:

Miller, Don E. and Vandike, James E., 1997, Missouri State Water Plan Series Volume II, Groundwater Resources of Missouri: Missouri Department of Natural Resources’ Division of Geology and Land Survey, Water Resources Report No. 46, 210 p., 77 figs., 17 tbls.

For a list of other references used in this article and more information, visit this website:

[dnr.mo.gov/geology/geosrv/imac/stpetersandstone.htm](http://dnr.mo.gov/geology/geosrv/imac/stpetersandstone.htm)

## Contractor and Apprentice Well and Pump Installation Testing Schedule

The following testing dates are scheduled to begin at 9 a.m. at the Missouri Geological Survey, 111 Fairgrounds Road, in Rolla.

October 16, 2013

November 13, 2013

December 18, 2013

Testing dates may be modified if necessary. Questions concerning this schedule or testing can be answered by calling 573-368-2450. Anyone who may require special services due to a disability should contact Jeannie Hoyle at the number above.

A photo ID is required in order to take the test. If applying for a non-restricted permit, please bring a global positioning system (GPS) unit and operating manual to the test site. GPS units should be programmed to read in degrees, minutes, and seconds in accordance with 10 CSR 23-3.060(5).

## Pre-Notification for Heat Pump Systems

At the August 23, 2013, Well Installation Board Meeting, proposed amendments to the heat pump rule were approved and will become effective January 1, 2014. Pre-notification will be required for any heat pump system using five-foot grout plugs every 40 feet. Heat pump systems that are grouted full length are not required to pre-notify. Pre-notification must be completed 48 hours in advance. The 48-hour notice can be submitted by email, fax, phone message, mail, in person or via the online notification form (coming soon). Notification will require the owner name and address, GPS location, date work is to begin, primary contractor name and permit number, and drilling contractor name and permit number. We recommend pre-notification take place when the required Missouri One Call (DIG-RITE) notification is made. It only takes a few minutes. Coordination or approvals are not needed from the department; just provide notification and after 48 hours begin working. Staff appreciate everyone’s cooperation in this rule change.

## Staff News

### Kimberly McCullah Joins the Section

Kimberly McCullah recently accepted the position of Correspondence Clerk with the Wellhead Protection Section and officially began her duties September 4, 2013. This position was vacated by the retirement of Ruth Ann Williams.



Kimberly is new not only to the city of Rolla, but also the state of Missouri as she is a California native.

She and her family moved to Rolla in the fall of 2012. Kimberly brings with her a variety of education and experience, including more than four years of experience as an administrative assistant with a chiropractic office and an audio/video installation company. She received a bachelor's degree from Azusa Pacific University in Southern California.

When asked for a few words, Kimberly said, "I am thrilled to begin my journey into the world of Wellhead Protection. I know I have much to learn, but I look forward to adding my skills to the team. I am grateful to be added to a team as efficient and skilled as our unit. I look forward to working with everyone."

Kimberly can be reached at 573-368-2318.

## Survey Staff Attend Karst Hydrology Course

In June, the Missouri Geological Survey sent three geologists to Bowling Green, Kentucky, for training at a week-long Karst Hydrology course offered by Western Kentucky University. The participants were James Papin and Jeremiah Jackson, Environmental Geology Section and Brad Mitchell, Wellhead Protection Section. The course provided a unique opportunity for staff members to gain valuable hands-on field experience and access to rarely visited portions of Mammoth Cave under the leadership of experts in the field of karst geology.

The course consisted of formal lectures, field demonstrations, and field trips. Lecture topics included: theory of groundwater flow in karst aquifers, the movement of contaminants in karst aquifers, groundwater chemistry in carbonate rocks, methods for tracing water using fluorescent dyes, mechanisms and risks associated with sinkholes, and the development and evolution of karst aquifers. Field demonstrations provided hands-on training in dye tracing techniques, including dye injection, collection, measurement and interpretation. Field trips provided direct observation of many of the features and environmental issues discussed in the lectures.

The purpose of the training was to develop a broader understanding of the behavior of drainage basins in carbonate terrains, the functioning of karst aquifers, and the evolution of karst aquifers over time. On the practical side, the three geologists gained greater insight into water supply problems, water quality threats and problems relating to sinkholes in karst areas.

## Welcome Contractors

The following individuals are now part of the Missouri Department of Natural Resources' permitted contractor community:

Amec – Jack Friesner  
Bradburne, Briller & Johnson – Amber Cicotte  
Geo Engineers – Justin Brown  
HDR Engineering – Lisa O'Dell  
Midwest Environmental Cons – Chad Backes  
Sunbelt Environmental – Kyle Davidson  
Terracon – Allen Nash  
White Mechanical – Jeff Stephens

## Welcome Apprentice Contractors

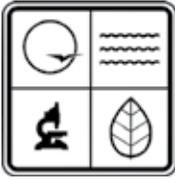
The following individuals are now part of the Missouri Department of Natural Resources' permitted apprentice contractor community:

Cascade Drilling – Mark Schulz, Todd Schmalfeldt  
Drill It Well dba Hewitt Messenger – Bryan Wernink  
Fennewald Plumbing – Gerald Fennewald, Tabitha Aldridge  
Jerry Williams Pump & Well Serv – Kodie Williams  
Koehler Engineering – Simon Cort  
M & M Well Drilling – Delmer Moore  
R B Grabher Drilling – Bryson Grabher  
Sunbelt Environmental – Kyle Farrar, Kyle Davidson  
Well Water Systems – Dayton Lewis

## Farewell

The following individuals are no longer permitted to operate as contractors according to the Water Well Drillers Act and Well Construction Regulations:

Boart Longyear – Tony Staggs, Eddie Hearell  
Combs Pump Service – James Combs  
Fayetteville Mechanical – Gary Webb  
Ground Source Systems – Brandon McCarthy  
Gunlock Heating & A/C – Kendall Gunlock  
Herst & Associates – Shane Tamborski, William Abernathy  
Jack Wallace Construction – Jack Wallace  
Kissick Construction Co – Brian Gylmn  
Marshall Eye Drilling – Darryl Haderlein  
Miller Drilling Co – Mark Miller  
Roger Kessinger Pump – Roger Kessinger  
Rupp, Joshua  
White Mechanical Contractors – Jeff Stephens



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**Website:** [dnr.mo.gov/geology/geosrv/wellhd/job.htm](http://dnr.mo.gov/geology/geosrv/wellhd/job.htm)  
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