



VOLUME 21 NUMBER 1 MISSOURI DEPARTMENT OF NATURAL RESOURCES FIRST QUARTER 2014

Well Installation Board News

The Well Installation Board held its quarterly meeting November 1, 2013, at the Missouri Geological Survey, in Rolla. The Board received updates about section activities, upcoming staff changes, and proposed rulemakings.

The next quarterly meeting is scheduled for Monday, Feb. 24, 2014, at 10 a.m. at the Country Club Hotel and Spa (Cypress Room), 301 Carol Rd., Lake Ozark. The May 2014 meeting will be held Friday, May 2, 2014, at 10 a.m. at the Missouri Geological Survey's Mozarkite Conference room, in Rolla.

Receive Updates on Rules and Section Services

Did you know you can sign up to receive updates regarding multiple topics related to the Wellhead Protection section? Our GovDelivery system allows website visitors to subscribe to information of specific interest to them. Red envelope icons are available on many of the department's Web pages identifying this service as being available. Individuals are able to create a personalized subscription list of content. When this content changes, such as rule updates, GovDelivery automatically sends email or text alerts informing subscribers.

Go to the Wellhead Protection section Web page located at dnr.mo.gov/geology/geosrv/wellhd/ and click on the red envelope, enter your email address or sign in via social media and choose the topics for which you would like to receive updates. In addition to topics related to wellhead protection, subscribers may select from numerous other topics. Questions regarding this feature should be directed to 573-368-2165.



Driller Bi-monthly Report Change

Since 2006, staff with the Wellhead Protection section (WHP) compiled and mailed a bi-monthly report to all contractors who submitted records to WHP during the previous two month time period. However, because WHP has been offering online search via the Wellhead Online Services website for more than a year, this report has become unnecessary; therefore, the last bi-monthly report was mailed in January 2014.

This change will result in substantial savings to WHP through postage, paper and printing costs, as well as staff time to compile and mail the reports. The same information is available 24/7 by going to this website: dnr.mo.gov/mowells. Questions regarding the online system should be directed to 573-368-2165.

2014 Brings Change and Web Enhancements

A new year often brings change. The most notable change involves our name. In August, the Division of Geology and Land Survey became the Missouri Geological Survey. This name change was prompted because the state legislature moved the Land Survey Program to the Department of Agriculture.

Additionally, the following items will be of interest to contractors:

- The Wellhead Protection section (WHP) continues to make more services and data available online. Wellhead Online Services may be accessed at dnr.mo.gov/mowells. At this website, anyone may search for contractors and well and pump records. Contractors may submit monitoring well certification and registration, water well certification and pump records, as well as renew operating and vehicle permits. Soon, online testing for a restricted permit will be available.
 - Forms are now single sheets and no longer have carbon copies.
 - Owner signatures are no longer required for well certification.
 - A user fee is being assessed when payment is made by credit card or electronic check. This fee is imposed by the credit card company and does not go to the department.
 - The Heat Pump Rule became effective January 1, 2014. Please keep in mind that full-length grout is required for any geothermal well that is greater than 200 feet in total depth. A variance is not required for wells drilled to depths of 500 feet or less. If a geothermal well is grouted using a series of five foot plugs, the total depth of the well must be 200 feet or less, and prenotification of the work is required. WHP must be notified no less than 48 hours prior to any work being performed. Prenotification may be made by calling 573-368-2165, emailing welldrillers@dnr.mo.gov, faxing 573-368-2317, submitting online dnr.mo.gov/forms/780-2167.htm or mailing WHP at P.O. Box 250, Rolla, MO 65402.
- Notification must include owner name and address, GPS location, date work is to begin, primary contractor name and permit number and drilling contractor name and permit number. The printable form is available at: dnr.mo.gov/forms/780-2167-f.pdf.
- Direct expansion heat pump systems that use copper tubing and refrigerants will no longer be allowed, as of January 1, 2015.

Special Area 2 Updates

Each year Wellhead Protection section staff members review and update the casing depth map for Special Area 2. Data that may affect an area is collected by the well or pump contractor when a new well is drilled or an old well deepened. Data is also collected by the U.S. Environmental Protection Agency and environmental contractors during environmental investigations. This data is collected for new and existing wells. New impact areas are added and, if available, any published updates for area roads are added to the revised map.

New Category Added to 2014 Map

Due to structural conditions found in the geology within some quarter sections, an advisory area was added that requires drillers to contact the Wellhead Protection section 48-hours prior to drilling the well, unless the recommended amount of casing is installed and the casing grouted through the Northview or Chattanooga shale formations. This new category is delineated on the map by the standard color for advisory areas, with the addition of diagonal gray lines.

The current map is valid from January 2014 through January 2015. The map is reviewed and updated through the months of November and early December each year, and the new map is revised for the next calendar year. The effective dates are clearly noted on each map. It is the responsibility of the contractor to use the correct map when drilling in Newton and Jasper counties; all known impact areas may not be highlighted on an older version. The map for the period of January 2014 through January 2015 contains new impact areas and advisory areas. These areas are listed below.

Township North	Range West	Section	Quarter Section	Area Type	Minimum Casing	Contaminant To Sample For
27	30	07	SW	IMPACT	420	LEAD, CADMIUM
27	31	31	NE	IMPACT	420	LEAD
27	31	31	SE	IMPACT	430	LEAD
27	31	32	NW	IMPACT	440	LEAD
28	30	07	SE	ADVISORY	500	LEAD
28	33	15	SW	IMPACT	405	LEAD, CADMIUM
28	33	15	NW	IMPACT	415	LEAD, CADMIUM
29	32	33	SW	IMPACT	440	LEAD
29	32	33	SE	IMPACT	440	LEAD

An electronic copy of the Special Area 2 Map is online at dnr.mo.gov/geology/geosrv/wellhd/wellpub.htm or you may purchase a map by going to the Missouri Geology Store: missourigeologystore.com/productphp?productid=2824&cat=0&page=1

Welcome Contractors

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

Bureau Veritas North America – Agatha Banasiak
 Chase Pump Service – Richard Chase
 Climate Control LLC – Keith Buscher
 Four Seasons Plumbing – David Yost
 Frontz Drilling – Robert Hamilton
 Geosyntec Consultants – Maria Bonney
 Golder Associates – Jeffrey Ingram
 H R Quadri Contractors LLC – Stephen Bubanovich
 ITSI Gilbane – David Bowers
 MODNR – Jonathan McKinney, Justin Davis
 Roberts Environmental Drilling Inc. – Sean Dodel,
 Shawn Seymour
 Terracon Consultants – Kyle Loftus
 Thomlinson Pump – Robert Thomlinson

Welcome Apprentice Contractors

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

B & H Well Drilling – Francis Starke
 Dexter Well Drilling – Aron Adams, Richard Brookes Jr
 Geothermal Experts – Daniel Sample
 Sunbelt Environmental – Curtis Kellum, Daniel Yoakum

Farewell

The people addressed below are no longer permitted to operate as contractors according to the Water Well Drillers Act and Missouri Well Construction Regulations:

Aqua Wells – Adam Rice
 Back, David
 Bates, Richard
 Boyles Bros Drilling – James Estep
 Cardno ATC – Elizabeth Schlaeger
 Custom Environmental Services – Edward Paschal Jr
 Environmental Works – Meghan Guilford
 Free Energy LLC – Josh Frankeberger
 Geoscience Solutions – John Bogner
 Geotherm Drilling – Wade Hanks
 Govro Plumbing – Gary Govro
 Harrison Jr, William
 Harriss Drilling Services – Kenneth Harriss
 Hebel, Christopher
 Herst & Associates – Dana Sincox
 Letts & Demery Pump – Seth Cummings
 Murrell, Hugh
 Prater, Ryan
 Schnell Drilling – Valerie Schnell
 SCS Aquaterra – Kelly Hoyt
 Thompson, Jennifer
 White, Clint
 Young Construction Co – Kenneth Abner

St. Peter Sandstone

This is the final installment in a series of three articles that describe the geology and mineral resource potential of the St. Peter Sandstone in Missouri. The previous articles included a geologic summary of the St. Peter Sandstone, aquifer characteristics and industrial usage. This article will cover mining activities and summarize recent evaluation findings conducted by the Missouri Geological Survey.

Mining

The St. Peter Sandstone was first mined in Missouri in the 1870s for glass sand. Early mining, conducted at the surface and underground, was concentrated near the town of Pacific. As of December 2013, four companies were producing St. Peter in Missouri. Their mine sites are located in eastern and southeastern Missouri along the St. Peter outcrop band. Current production is from surface quarries using controlled blasting at the quarry face to break the sandstone into pieces. It is disaggregated by crushing or high pressure water-jet. The product is washed, separated into various size ranges, and dried by various methods depending on the desired end product. Cumulative production of St. Peter in Missouri is now greater than 65 million short tons, with an estimated present value of \$2 billion.

Evaluation Findings

Three geologic maps of the St. Peter Sandstone in Missouri were created to define the statewide outcrop belt and subsurface characteristics of the mineral resource. A structure contour map of the top of the formation, an isochore (drill thickness) map and an overburden thickness map were generated using a stratigraphic well log database and geologic maps across Missouri. Each map shows the outcrop and subsurface occurrences, as well as active and abandoned mining locations. Figure 1 is a generalized version of the isochore map with contours illustrating the drill thickness of the formation at 50-foot intervals.

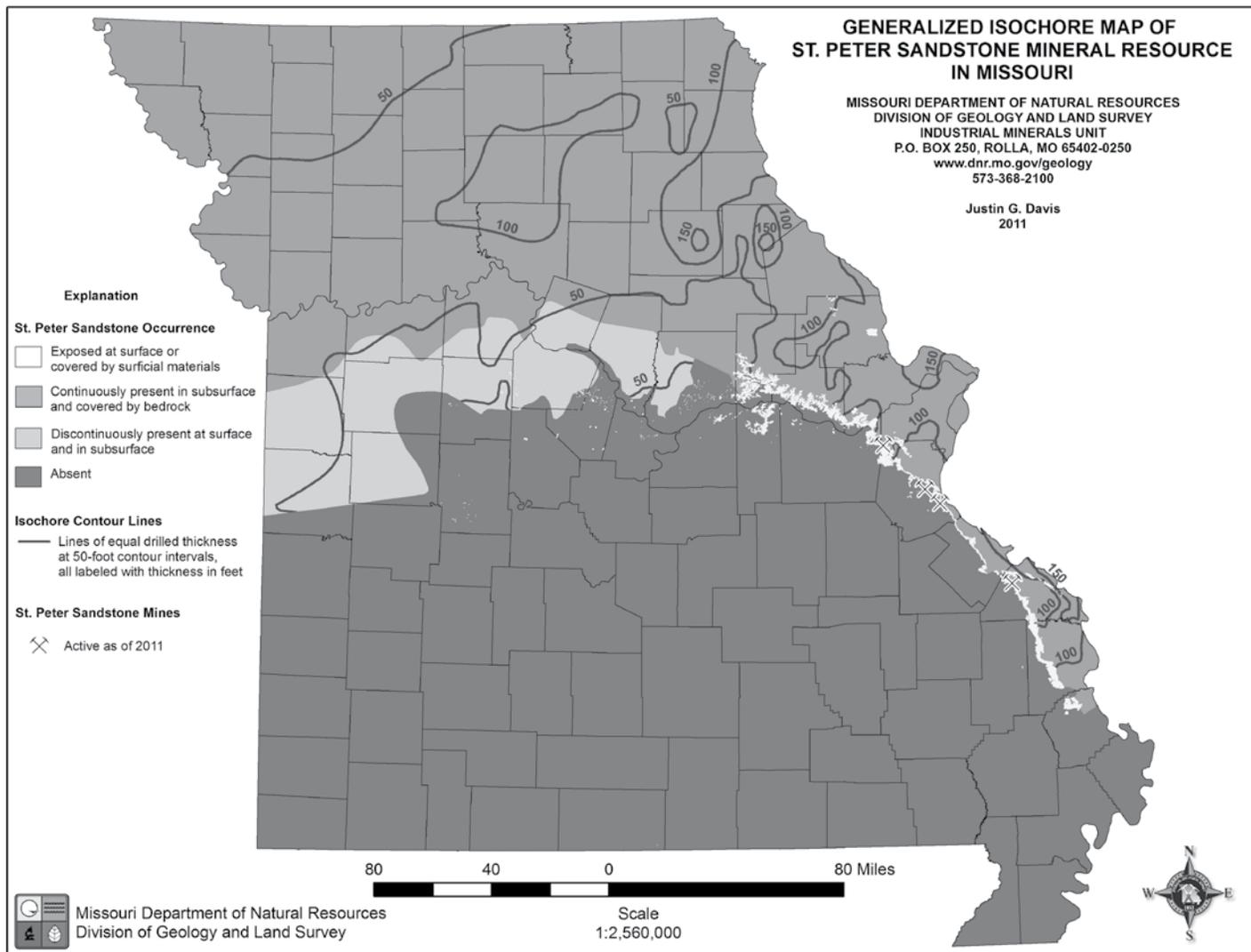


Figure 1. Generalized isochore map of St. Peter Sandstone mineral resource in Missouri.

The St. Peter is present continuously in the subsurface in the northern half of the state and the southeastern edge of the state. The St. Peter crops out in a narrow band that starts in western Montgomery County and runs southeastward, along the Missouri River, to just west of St. Louis and continues south, just west of the Mississippi River, through Scott County. The outcrop band varies from less than one mile wide to over ten miles wide, and it is more than 150 miles in length. The formation dips into the subsurface radially, away from the outcrop band. A notable isolated outcrop occurs in Lincoln County to the north of the main outcrop band. The St. Peter is present discontinuously in the subsurface along a band in the west-central portion of the state. The St. Peter is not present at the surface or in subsurface in the remainder of the state. The formation averages 80-100 feet thick. There is an estimated 3.8 trillion short tons of St. Peter Sandstone in Missouri.

According to Templeton and Willman (1963) the Tonti Member, which is the lower sandstone member of the St. Peter, is considered the finer-grained member, and the Starved Rock is considered the medium-grained member of the formation. However, sieve analyses of a limited number of drill cuttings samples from Missouri suggest that medium-grained sand preferentially occurs towards the bottom of the St. Peter deposit, which is the Tonti Member, and the finer-grained sand occurs towards the top in the Starved Rock Member.

Based on sieve analyses of drill cuttings from Missouri and sieve data contained in Ketner (1979), approximately 50 percent of the St. Peter in Missouri has a grain size that falls within the 40-70 U.S. Standard Sieve Series size range. The highest percentage of coarser sand occurs in the subsurface of the northeast corner of the state. Figure 2 shows sample locations and shaded zones representing the percentage of sand in the St. Peter that falls in the 20-40 U.S. Standard Sieve Series size bracket.

At three subsurface sample locations, the amount of sand within the 20-40 size range is greater than 10 weight percent. Figure 2 also depicts the northeast to southwest trend, supporting the idea that the sand is a succession of marine bars created by stepwise northward transgression of the sea over and across an eolian dune field. This map is intended to serve as a starting point for those interested in the coarser size fraction of the St. Peter.

It should be noted that the shaded zones outside the state of Missouri are estimations based solely on the sample data contained in Ketner (1979). Further research is needed to verify these trends.

Contact the Missouri Geological Survey (573-368-2100 or geology@dnr.mo.gov) for more information about the St. Peter Sandstone in Missouri and the mineral resource maps. For a list of references used in this article and more information, visit this website:

dnr.mo.gov/geology/geosrv/imac/stpetersandstone.htm

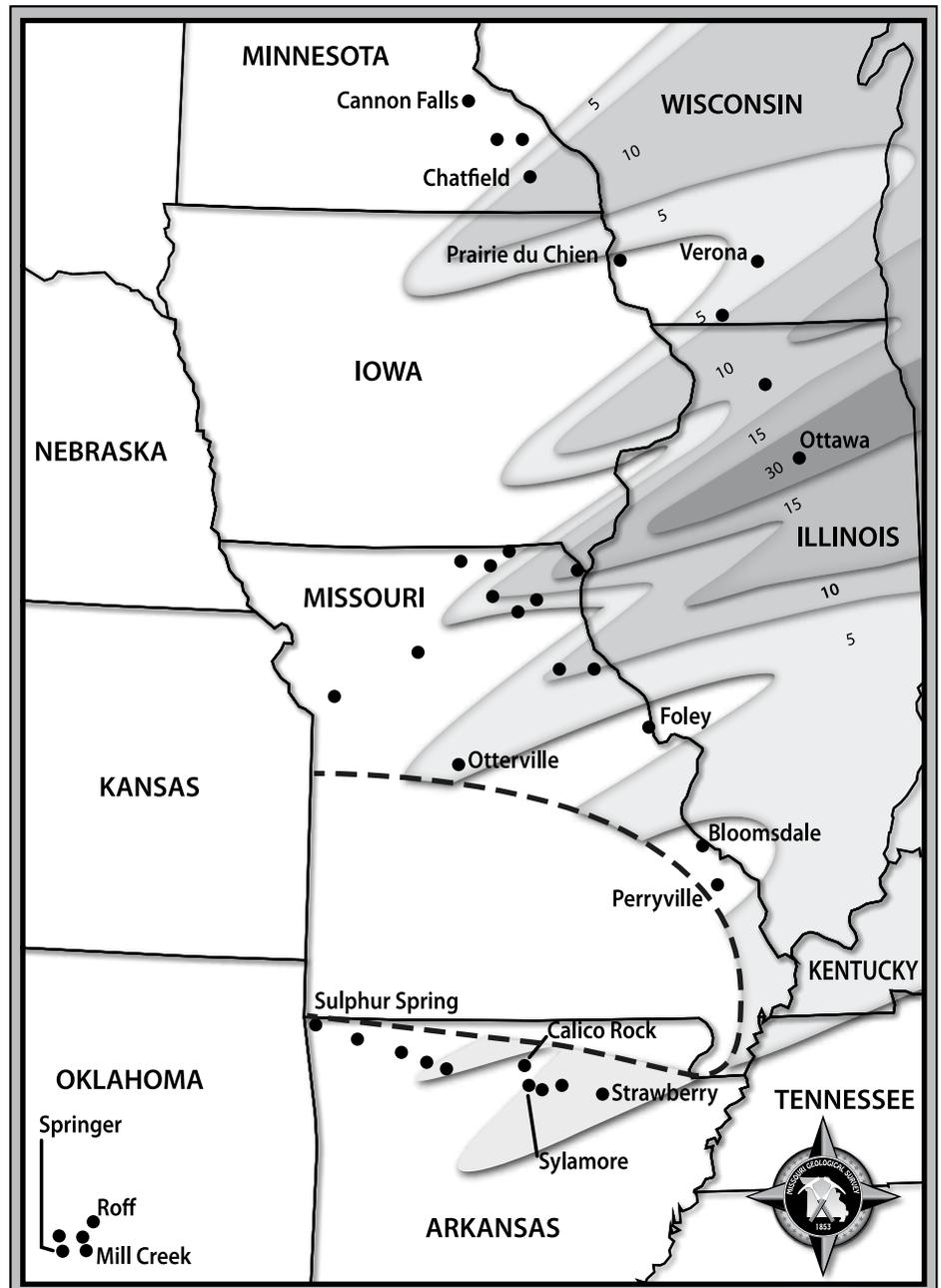


Figure 2. Map of the Midcontinent United States showing St. Peter sample locations as black dots. Shaded zones represent the percentage of St. Peter Sandstone that falls in the 20-40 U.S. Standard Sieve Series size range. Grain size data from Ketner (1979) and current work of the Missouri Geological Survey.

Staff News

Farewell from Kimberly McCullah

Kimberly McCullah resigned her position with the Wellhead Protection section effective December 13, 2013. Kimberly was an excellent employee and will be missed. We wish her the best in her future endeavors. Kimberly provided this farewell, "I really enjoyed working in the Wellhead Protection section and am grateful for the opportunity that was given to me. I am sad to see this part of my journey come to an end so quickly, as I had planned on staying with the department for many more years. My little two year-old will be happy to welcome me home though! Thank you everyone, for welcoming me into this warm and kind environment. I am truly going to miss it."



Molly Starkey Selected as Minerals Geologist

Molly Starkey accepted a position in the Missouri Geological Survey's Geologic Resources section November 1, 2013. Molly will work with economic geology and metallic mineral resources in Missouri. Her contributions to the Wellhead Protection section will be greatly missed, but we are pleased she will continue her career with the survey and wish her well in her new responsibilities. Molly shared the following, "I enjoyed my time with the Wellhead Protection section and learned a great deal working with this community. Although I began with a thorough understanding of groundwater and geologic principles, you have taught me many lessons about drilling, our state's water resources and the rulemaking process. Thank you for your help and patience. I am very excited about my new position and the opportunities and challenges ahead, but I will miss working with the drilling industry. I've only moved across the hallway, so please stop in and say hello if you're visiting Wellhead for some reason."

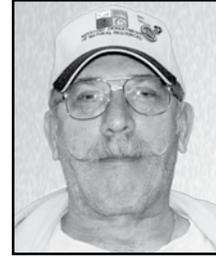


Wellhead Protection Section

We are here to ensure any new private well drilled in Missouri is constructed to minimum standards as set by state regulations. This helps protect our groundwater resources from contamination due to poor well construction. We regulate the construction of private water wells (this includes domestic and multiple family class wells), irrigation wells, monitoring wells and heat pump wells. In addition, we regulate how to properly plug all types of wells. Our job is to balance the concerns of the land owner and the driller, while at the same time performing our overall directive of protecting Missouri's vast underground water supply from contamination due to improper construction and abandonment of wells.



Paul Meyer Retires



Paul Meyer, Wellhead Protection Section Investigation and Remediation Unit, retired November 30, 2013. Paul worked as a Technical Assistant in WHP more than 17 years. His expertise and dedication to our mission will be missed. Thank you, Paul, for your service to the citizens of Missouri. Paul shared the following farewell, "I am pleased to announce my retirement. After many years in the Wellhead Protection section, it is time for me to say "later." I remember my first case in St. Louis with Lindell Lindsey and Gerald Buechting, to my last case at a chicken house facility near Malden, accompanying Sheri Fry. In between, there were over 400 other cases, a lot of issues resolved, a lot of miles spent on the road, many records checked and site visits made. I checked numerous abandoned wells, performed several downhole camera investigations, completed dye traces and resolved many other violations; one would wonder why they did not all blend together. They were all important and will remain a constant reminder of the work that was done. Now it is important for me to concentrate on the really important things in life and make use of one or more fishing poles. Remember, retirement may be an ending, a closing, but it also provides new beginnings."

**TESTING
in
PROGRESS**

Contractor and Apprentice Well and Pump Installation Testing Schedule

All tests begin at 9 a.m.

The following testing dates are scheduled at the Missouri Geological Survey, 111 Fairgrounds Road, Rolla.

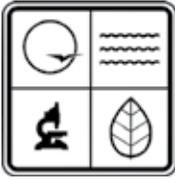
January 15, 2014	July 16, 2014
February 19, 2014	August 13, 2014
March 12, 2014	September 17, 2014
April 16, 2014	October 15, 2014
May 14, 2014	November 19, 2014
June 18, 2014	December 17, 2014

Testing dates may be modified if necessary.

Please bring a picture ID with you to the testing site.

If you are applying for a non restricted permit, please be sure to bring your global positioning unit (GPS) and operating manual to the test site. Your GPS unit should be programmed to read in degrees, minutes, and seconds in accordance with 10 CSR 23-3.060(5).

If you have questions concerning this schedule or testing please call 573-368-2450. Persons with disabilities who may require special services may contact Jeannie Hoyle at the number above.



Missouri Department of Natural Resources
Missouri Geological Survey
Wellhead Protection
PO Box 250
Rolla, MO 65402-0250

PRSRT STD
U.S. POSTAGE PAID
JEFFERSON CITY, MO
PERMIT NO. 440

Wellhead Protection Section Staff
573-368-2165

Staff Website: dnr.mo.gov/geology/geosrv/wellhd/job.htm

Well Online Services: dnr.mo.gov/mowells/

- **Kyle Rollins – Section Chief**
Management of Section, regulations, policy and rulemaking.
573-368-2171 • kyle.rollins@dnr.mo.gov
- **Justin Davis – Investigation and Remediation Unit Chief**
Field investigation and remediation, variances, casing depths, well construction and abandonment information.
573-368-2167 • justin.davis@dnr.mo.gov
- **Sheri Fry – Compliance and Enforcement**
Regulations, enforcement, policy, rulemaking and legislation.
573-368-2115 • sheri.fry@dnr.mo.gov
- **Christy Miner – Processing Unit Chief**
Information regarding pending enforcement letters, permitting and testing.
573-368-2174 • christy.miner@dnr.mo.gov
- **Eric Hohl – Technical Assistant**
Water well construction and certification information and abandonment registration information.
573-368-2168 • eric.hohl@dnr.mo.gov
- **Jeannie Hoyle – Permitting Clerk**
Permitting, testing and apprentice information.
573-368-2450 • jeannie.hoyle@dnr.mo.gov
- **Brad Mitchell – Geologist**
Field investigation, well construction information, variances and casing depths.
573-368-2116 • brad.mitchell@dnr.mo.gov
- **Matt Parker – Geologist**
Field investigation, well construction, Special Area 2, variances and casing depths.
573-368-2170 • matt.parker@dnr.mo.gov
- **Karen Smith – Section Secretary**
General information, fee letters, requests for forms and publications.
573-368-2165 • karen.smith@dnr.mo.gov