



World Wide Drilling Resource®

Volume 13 February 2016

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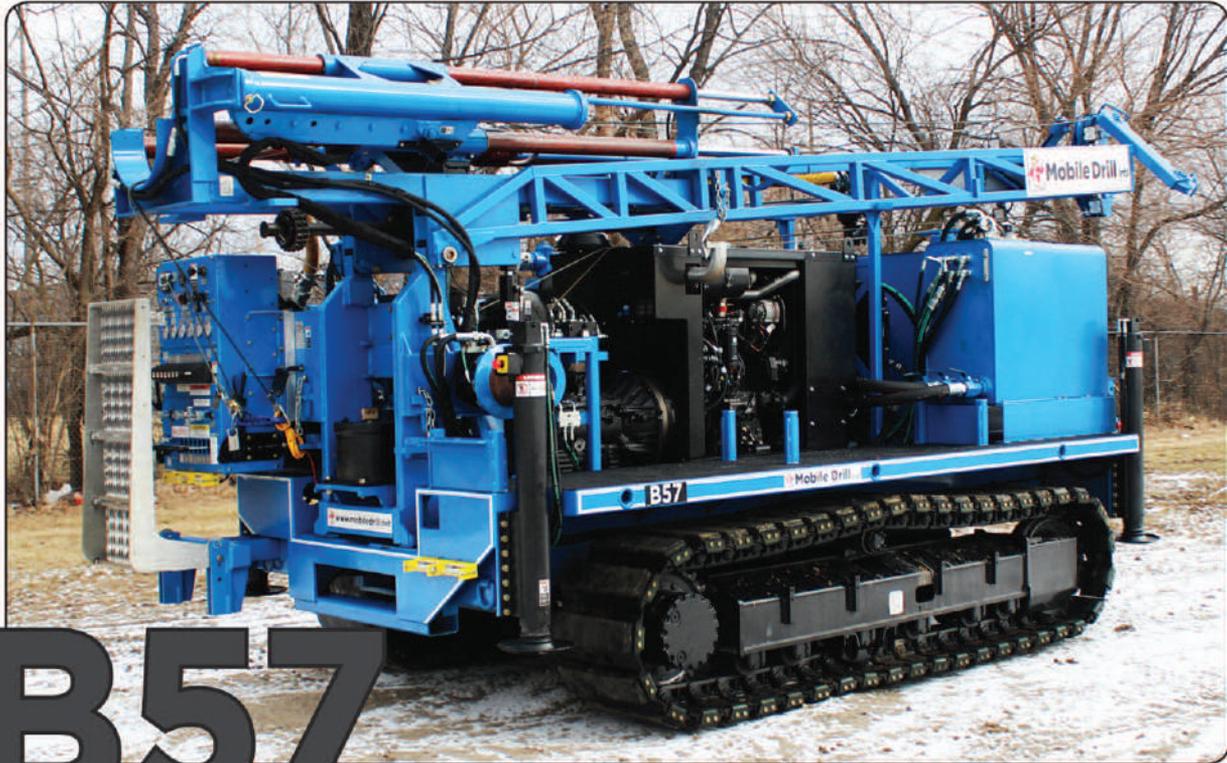
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Here we are already in the second month of this new year 2016. Time is on our side though. This year has a great many things in store for you and us as well.

Notice the "new" face in this great photo taken by our valued advertiser/part-time professional photographer, Donnie Wood (DRILLMAX) during the Expo in Las Vegas of the **WWD** Team Members present? You may recognize him from years past at **WWD** - DAVE HOSE has once again joined the Team. We say, "Welcome Aboard Dave!" If you get a moment, drop him a welcome note to dave@worldwidedrillingresource.com. Then, in case you missed it last month - check out our

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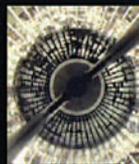
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My Story about the Drilling Industry and Its Caring for its Own

by John Christ
J.C.'s Drilling Consultant

The year was 1994, and I was in Tucson, Arizona. I had taken some time off due to being burned out after owning a recovery business, courier business, and a breakfast/lunch café all at the same time. After selling everything, I was spending a lot of time with my children. I was also golfing, hunting, and fishing. Then it happened, the boss (my wife) said it was time for me to go back to work. I didn't want to start another business. One reason was I had non-compete clauses, so I couldn't do what I was good at. I picked up the newspaper and saw an ad for a delivery driver. The guy who was doing the hiring said he wanted to take a ride, so we left at 9:00 a.m.; we went all over the state of Arizona, and got back at 11:00 p.m. He then said if I wanted the job, to meet him at the warehouse at 4 a.m.

Well, I showed up and we went to southern California to another jobsite. He was a mud engineer working in water well and mining. This was my introduction to the drilling industry. It was a small drilling fluids company, and even though we were only two guys, we gave the big drilling fluids company a run for the money. You know what happens, the big company buys the small company. I have mostly worked for myself. The big company is just that. The guy I was working with didn't last long. He went to the oilfield where he had lots of contacts and experience. He told me to let them train me and he would take care of me. So I was sent to mud school, and when I got out, the mining business which goes up and down, was on a down stroke.

I really didn't want to follow the guy who got me into the business, so I got transferred actually to the part of the country where I grew up - the northeast part. I did well and made a name for myself. I was a direct influence in starting the first state association for horizontal directional drilling (HDD). I was on many state associations along with the national association. I worked with state regulators writing construction rules. I also climbed the corporate ladder.

Then in 2008, the country took a turn for the worst. In the HDD business, we were doing a lot of utility installations, telecom installations, and pipeline work. The water well industry took a bad hit. Being part of a large corporation and being in management, we had meetings about everything. I didn't agree on the direction the company was going and had some health issues which needed to be attended to, so I took an early retirement after almost 20 years in the business.

There is an award in the water well business the national association puts out. It took a couple years, but I was an influencing factor in getting a friend this recognition. The national association's convention was in Nashville, Tennessee, that year. I was talking to a special friend in the industry and she offered to pay for my and my wife's admission to the show. The drilling industry is all about relationships. I still talk to the guy who first hired me back in Tucson every year on my anniversary date.

There is a large HDD show in Louisville, Kentucky, every other year. With résumés in hand, I went to the show and started passing them out. I ran into a friend who had a fairly large HDD company based out of Cleveland. He wanted help to get more involved in the pipeline business and just had a shakeup of employees. The new crew was a bunch of guys I had worked with off and on for 15 years.

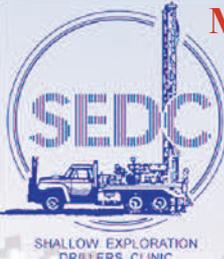
The pipeline business is very competitive. After about a year, my friend told me he was done with that side of the business. Here I go again, unemployed for the second time in two years. All the while, I'm still getting calls from drilling professionals with problems. Remember I said the drilling industry is about relationships? Sure, I can say I'm no longer with the large corporation and give the people the corporations' contact information, but these are my friends from those relationships. So I answer their questions.

Unfortunately, I was in a bad accident and cannot do what I think is my best asset, talk. The only way I can keep in touch with people in the industry is by texting and e-mailing, so I have been reaching out. Even though I'm getting a lot of sympathy,

I'm a little disgruntled with my relationships. I know I'm limited, but someone who has tried and helped me in the past, is trying to help me again. I love the drilling industry! Thanks for the great relationships! Hopefully, I can share some more insight into what our drilling industry is losing, and how we might get it back. And now for my next career...a contributing writer for *WWR*!

John

John Christ may be contacted via e-mail to michele@worldwidedrillingresource.com



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February is Amethyst

by Harry W. Short
Short
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February's birthstone is a purple to violet crystalline form of quartz composed of silica and oxygen. Amethyst's color may have originated from small concentrations of manganese present during formation. When amethyst is exposed to heat it becomes colorless; however, the color returns with a smoky hue when subjected to radiation.

The name comes from the Greek word *amethystos* meaning "not drunken." An amethyst jewel placed in a wine goblet filled with water gave it a purple

coloration and thus was a remedy for drunkenness. The ancient Anglo-Saxons made beads from amethyst. When worn in battle as an amulet during the Middle Ages, the stone was thought to protect soldiers from injury.

Royalty held the amethyst in high regard. Edward the Confessor, who became King in 1042, first wore an amethyst gem in the British Crown. This is likely the oldest gemstone in the British Crown Jewel collection. In the 18th century, amethyst was considered to be as valuable as diamonds. Queen Charlotte of England had an amethyst necklace valued at \$10,000. Rings worn by the popes and cardinals have amethyst gems and are considered sacred.

Amethyst is found in geodes, on the walls in cavities, or as veins in granite and other igneous rocks. It's a valuable gemstone due to its deep, uniform color. Without its characteristic color, the gem will be nearly colorless and looks like clear quartz. Large crystals for gem purposes are generally rare because the color is not uniformly dispersed through the crystal. Large crystals are used for study in geology classes or displayed by collectors and in museums.

Amethyst crystallizes with six sides in the hexagonal system with pyramids on each end terminating in a sharp point unless it occurs in a mass of crystals. Its hardness is 7.0; specific gravity is 2.6 and has a conchoidal fracture. The purple crystals are easily identified because of their shiny luster and hexagonal shape. Good gem-quality amethyst is transparent to subtranslucent and should have no fractures or inclusions.

It is believed the early European amethyst came from Russia. However, the gemstone has also been mined in Brazil, Uruguay, India, South Africa, and Sri Lanka. In the United States, amethyst has been found in Texas, Delaware, Pennsylvania, North Carolina, Maine, and Yellowstone National Park. At one time, beautiful amethyst crystals were collected in rock along the north shore of Lake Superior.

Harry

Harry Short may be contacted via e-mail to michele@worldwidedrillingresource.com



Amethyst crystal photo by Chip Clark.

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BREAKING NEWS



Brian Broga and Pentair Intellidrive.

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WHO'S IN THE NEWS



Scott Fowler

Former National Ground Water Association (NGWA) President Scott Fowler, CWD/PI, was presented the association's top honor, the Ross L. Oliver award for outstanding contributions to the groundwater industry.

For additional Who's in the News announcements, including more about Scott and other NGWA award recipients, visit worldwidedrillingresource.info/Whos1.pdf

Send your Who's in the News to: promotions@worldwidedrillingresource.com



bauma 2016 Poised to be the Hub for Innovation

Adapted from a Press Release by Messe München

Low emissions, low fuel consumption, and energy efficiency: All these qualities are becoming even more important to the building industry and to manufacturers of construction machinery. So, what progress has been made? What new developments are there, and what can these machines still do? Answers to these questions will be given at bauma, the world's leading trade show for construction machinery, building material machines, mining machines, construction vehicles, and construction equipment, April 11-17, 2016, at the Messe München exhibition center in Munich, Germany.

Since the introduction of the Exhaust Emissions Directive in 1999, the construction machinery industry has drastically reduced the emissions from its products. According to VDMA (the German Engineering Federation), emissions of nitric oxide and diesel particulates have been reduced by more than 95%. Joachim Schmid, managing director of the VDMA's Construction Machinery and Building Materials Machinery Association, describes the status quo: "With the aim of optimizing energy efficiency and obtaining the best possible work result, these days construction machines decide for themselves what is most economical in a particular work process: to transfer the power to the wheels mechanically or hydraulically. The drive chain delivers only as much power as needed; energy is stored and delivered as required. And for years the eco mode has been standardized in many types of machinery."

Despite what has already been achieved, there is still room for improvement with transmission systems in construction machinery - especially

when manufacturers and suppliers combine their expertise. This was the case in the TEAM project (development of technologies for energy-saving transmission systems in mobile machinery), which culminated in the spring last year with the presentation of a "green wheeled loader". For three

years, 18 machinery manufacturers and suppliers - among them Caterpillar, Danfoss, Deutz, Hydac, and Rexroth Bosch - five university institutes, and the VDMA worked on an innovative operating strategy for linking parts of the drive system.

A demonstration wheeled loader was presented which combines an optimized diesel engine, a powersplit transmission system, displacement-controlled working hydraulics, and a hydrostatic hybrid system in a new drive chain. In comparison to a current series machine, this new development is over 10% more fuel-efficient in practical operation. At bauma, further information and details about this development will be presented live in the "Research Initiative" in Hall B0. Special power-split transmissions are definitely gaining ground in wheeled loaders. Prof. Dr.-Ing. Marcus Geimer, Chair in Mobile Machinery at the Karlsruhe Institute for Technology commented, "In a wide variety of operations, these transmission systems deliver improved efficiency as compared to hydrostatic transmissions or switchable converter drives." Geimer reports corresponding prototypes and designs have already been presented at various specialist conferences. "Now I am keen to see which manufacturers will showcase these components at bauma 2016," he said.



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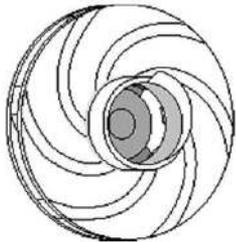
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Denver
by **Bill Corey**
Pentair Water
Training Institute

So last month, we learned if we lower the pressure over 70°F (21°C) water, it would flash or convert from a liquid to a vapor. Remember we call it boiling, or in pump language "cavitation". The conversion of a liquid to a vapor.

We also asked the question: What does the 14.7 psi have to do with our centrifugal pump? If our pump is primed - meaning we have it filled with water - remember if you don't have it filled with water and turn it on we call it a FAN because all it does is move air around. Yes, even submersible pumps have to be primed. However, once filled with water - primed - when we turn the pump on, the impeller starts to spin and move the water from the inside or eye of the impeller to the outside or peripheral where it exits through the port of the impeller.



When you look at the impeller, the vane moves with a curve from the eye to the port. Looking at the area between the vanes at the eye and comparing it to the area between the same vanes at the port, we can see where Bernoulli's Law comes into play. Bernoulli stated that if the area is smaller, the water will have to move faster, and as the water moved faster the pressure would be lower. So the impeller is designed to always have a lower pressure at the eye than at the peripheral. This of course is how the weight of the atmosphere helps move the water from its source to the impeller eye.

Remember $14.7 \text{ psi} \times 2.31 \text{ FoH} = 33.95 \text{ FoH}$ (feet of head). So as mentioned last month, we can theoretically lift - you are actually pushing the water from its source to the pump - water 34 feet. Of course, this is at sea level and does not take inherent losses into account. Most engineers will say 25 feet is the maximum lift for a centrifugal pump at sea level. It is the weight of the atmosphere that pushes the water up to the pump. We call it lift.

The other really important thing to remember is this is all happening at sea level. As you go up in altitude you lose the ability to lift water. The reason is, you lose atmospheric pressure. You will lose about 1 psi for every 2000 feet for the first 8000 feet you go up. Denver is known as the Mile High City and a mile is 5280 feet. This means at 4000 feet you will have lost 2 psi;

another 1000 feet and you lose 1/2 psi; the last 280 feet not quite but let's call it .2 psi, which makes a total of 2.7 psi loss $\times 2.31 \text{ FoH} = 6.24 \text{ feet}$. This means if I can lift water at sea level at 25 feet, in Denver I could use the same pump, but only lift it 19 feet of lift!

Let's talk about NPSH next month.

Bill

Bill Corey may be contacted via e-mail to michele@worldwidedrillingresource.com

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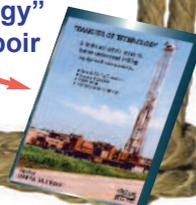
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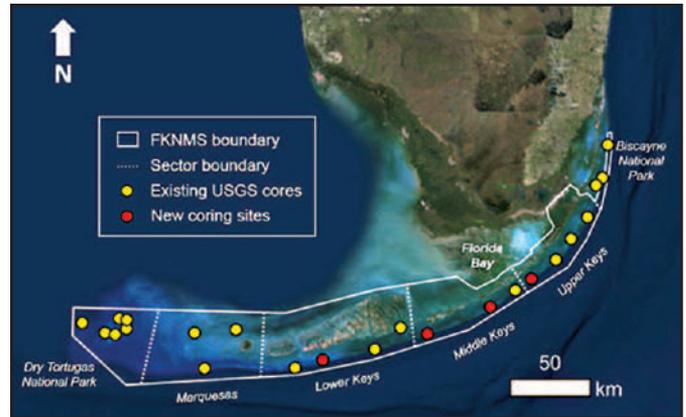
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Coral Reef Coring in the Florida Keys

Adapted from Information Provided by the U.S. Geological Survey

The Florida Keys Reef Tract (FKRT) is an invaluable natural resource made of coral reefs which protect the state's shoreline by reducing wave energy; providing a critical habitat to associated marine life; and contributing roughly \$3 billion to local economies annually. Over the last few decades, coral reefs throughout the world have faced decline due to various disturbances. Unfortunately, the FKRT is no exception to this trend, and researchers are working to gain insights into the future of Florida's coral reefs by investigating how they responded to environmental changes in the past.

Core samples from coral reef frameworks provide crucial records of reef development across millennial time-



Florida Keys National Marine Sanctuary (FKNMS) boundary.

scales. Researchers from the U.S. Geological Survey (USGS) have been using underwater hydraulic core drilling to collect cores from reefs off the Florida Keys since the early 1970s. As a result, USGS - Saint Petersburg has an extensive archive of cores. The school is using these existing reef cores, along with new cores being collected, to better understand spatial and temporal trends in development.

Core records are being used to reconstruct the species composition of reefs during the Holocene epoch to determine how modern reef assemblages compare to past assemblages. Holocene coral skeletons are also being analyzed to determine if coral growth rates have changed over time. Paleocological data will be compared with records of net vertical reef growth over time to find out which ecological changes could have characterized changes in reef growth in the past. A better understanding of reef changes in response to past environmental changes can help scientists make predictions about how Florida's reefs might respond to changes in climate, water quality, and sea-level rise in the future.



Reef core collected from Dry Tortugas National Park. Numbers indicate the depth of penetration into the reef in feet.

Product Spotlight

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What Makes a Good Water Well?

Adapted from Information Provided by Cotey Chemical Corporation

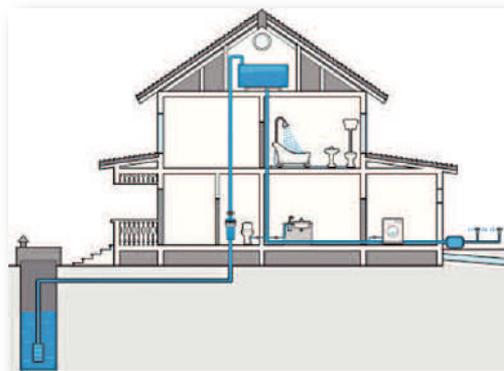
Three main ingredients go into making a good water well: drilling, pumping, and developing. The first two ingredients are indispensable since an opening has to be made in the water-bearing formation and a means must be supplied to lift water to the surface.

The third ingredient, development of the well, is often overlooked. In many instances, wells are drilled, pumps are installed, and the obtained flow is accepted, though it may not be the desired flow. A conclusion is made this is all the water available from the formation. Cotey Chemical reminds us this conclusion is probably not true and the flow might be increased with proper development.

Mechanical methods for developing water wells include: bailing, pumping, backwashing or backlashing with the pump, surging with a surge block or compressed air, using explosives, jetting, or fracturing. Each of these mechanical efforts attempts to open perforations with force by applying pressure from the well bore out into the formation. During development, pressure is applied in the same direction as it was during drilling operations, which can plug some water pathways in the process.

Once a well is drilled, all the mud cake must be removed if the well is to be developed to its maximum capacity. The combination of properly used chemical treatments and mechanical agitation methods are quickly gathering acceptance as highly effective ways for removing mud and opening perforations and water-bearing formations.

For a chemical treatment to work, the chemistry must match the problem. Some chemicals must be effective in dissolving, disintegrating, and dispersing commercial drilling muds, clays, and shales so they can be easily bailed or pumped to waste. Others should be capable of dissolving limestone and water-deposited scales, corrosion



products, and organic growths.

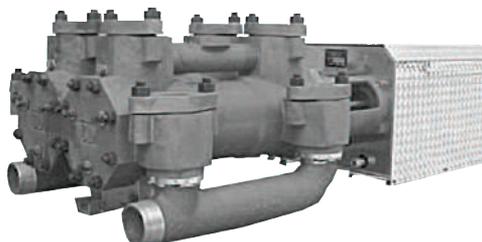
If it's going to be used in a water well, any chemical should meet certain requirements: it should be relatively nontoxic and should not contaminate water; it should be safe to use on mechanical equipment in the well; it should also be safe and easy to handle. From a contractor standpoint, chemical treatments should be services which can be performed without additional equipment. Certain chemicals have been developed specifically for use in water wells, making it possible for a contractor or well service company to include chemical treatment along with other services, adding extra profit to a job while also making a better well for the customer.

Flow loss in many wells is simply due to a lowering water table; in which case, nothing can be done except drill another well or use less water. However, for the majority of water wells, flow loss is due to biological and/or mineral deposits plugging the natural flow of water. At this point, the problem is not how or why the water flow is obstructed, but how best to remove the obstruction so maximum flow can be achieved.

As you go about the work of drilling wells, do not overlook the crucial step of well development. Effective chemicals for removing practically any type of water-pathway obstruction are available. In addition to mechanical agitation methods, a properly designed chemical treatment can make it possible to complete a job better in less time. The one-two punch of chemical and mechanical methods for treating a well provide a combined effect hard to match in today's industry.

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School to Research Gas and Oil Technology for EGS

Adapted from a News Release by the Colorado School of Mines

In the search for reliable, carbon-free electricity, geothermal energy has gained a great deal of attention. The same technology which fueled America's oil and gas boom may be putting this resource within reach. A collaboration between the Colorado School of Mines (Mines) and the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is working to use the tools of modern gas and oil extraction to develop geothermal resources.

The concept behind EGS (enhanced geothermal systems) is simple: inject water into hot, dry rock; let the hot rock heat the water; extract the hot water as steam; drive a turbine with the steam; produce electricity; reinject the cooled water; and repeat.

The Mines-NREL Colorado Collaboration for Subsurface Research in Geothermal Energy (Colorado SURGE) is getting into those details on projects spanning geothermal reservoir characterization, drilling approaches, and water treatment. The effort, launched in 2014, is being paid for by funding from DOE starting with \$800,000 in 2014 and \$1.2 million in 2015. Future years funding will depend on the progress and independent review of proposals, but the Colorado SURGE team is planning for growth.

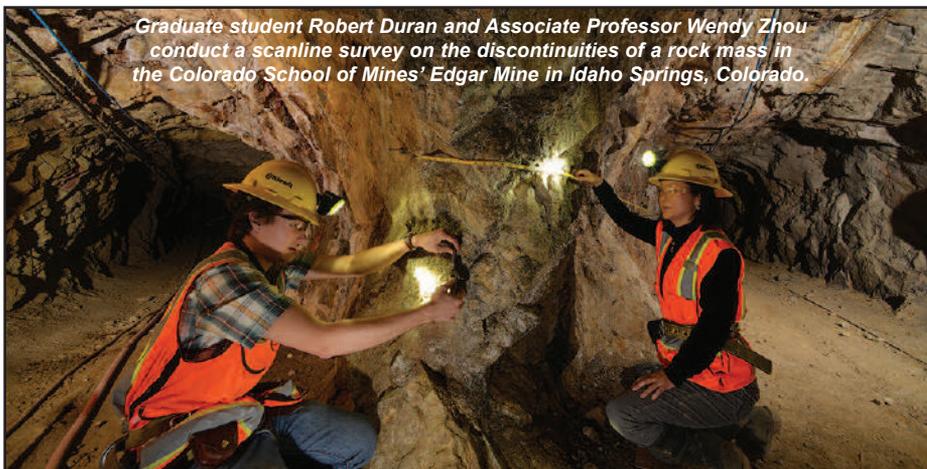
"The idea of adapting advanced oil and gas technologies for geothermal was a very high priority for the DOE," said Dag Nummedal, who directs Mines' Colorado Energy Research Institute and worked with NREL to launch SURGE. In early 2015, Mines Professor Wendy Harrison, just back from an 18-month appointment leading the National Science Foundation's Earth Sciences Division, took over SURGE leadership at the school.

Tom Williams, who directs NREL's Geothermal Technologies Program and federal lab's side of SURGE, said NREL had recognized their lab lacked capabilities in geology, oil and gas technology, water treatment, and other areas critical to EGS - not to mention access to students. Mines, right up the road, was the obvious choice, he said.

The conclusion so far is, while the technology piece is tough, the real hurdles are economic. The key, will be to improve an array of technologies and techniques, particularly on the drilling side, to bring the costs down.

A 2008 U.S. Geological Survey estimate on the heat beneath 13 western U.S. states suggested a potential geothermal resource of roughly 345-727 gigawatts. In 2011, Google.org and Southern Methodist University's Geothermal Laboratory estimated the technical potential of EGS, accessible at depths of about 11,500-21,000 feet, to be 2980 gigawatts. The entire U.S. electrical generation capacity amounted to 1051 gigawatts in 2011.

The problem is you've got to get down there, and the shallow side of EGS is the deep end of oil and gas drilling. To reach the minimum temperatures necessary for geothermal power production (300°F or 150°C) in places like Michigan and Florida, you'd need to drill over 32,000 feet (roughly 6 miles).



Graduate student Robert Duran and Associate Professor Wendy Zhou conduct a scanline survey on the discontinuities of a rock mass in the Colorado School of Mines' Edgar Mine in Idaho Springs, Colorado.

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Since the most favorable EGS targets in the West are in granite formations, as opposed to the sedimentary formations where tight oil and gas are harvested, drilling is a lot slower and more expensive. How hydraulic fracturing might work in those formations at high temperatures and pressures isn't well-understood. Additionally, EGS wells are larger in diameter which adds to the cost. In fact, an MIT (Massachusetts Institute of Technology) team estimates the cost of an EGS well could be up to five times more costly than an oil and gas well. Not to mention, in oil and gas drilling the deeper you drill, the more it costs. According to the MIT team, it costs an average of \$600,000 to drill to 6500 feet, this increases to \$10 million or more at 19,500 feet.

Associate Professor Bill Eustes and Professor William Fleckenstein have two undergraduates and a graduate student looking at the feasibility of horizontal geothermal completions. Other graduate students are doing EGS fracture stimulations and studying thermal cycling on casing strings and other drilling hardware. Nine Mines undergraduates are looking at drilling performance of oil and gas versus traditional wet-rock geothermal, trying to figure out the limitations and gain insight into what might be done to improve drilling operations.

EGS researchers around the world have a long way to go. Globally, EGS is in the demonstration stage, with commercial deployments yet to come. Williams said DOE is playing the long game, saying he sees EGS as a very early-stage technology, the same way photovoltaics was in the early 1960s, when solar panels cost thousands of dollars per watt (today, rooftop panels can be had for less than \$1 a watt).

Vermeer Announces New HDD Operator Training Program

Adapted from a Press Release by Vermeer Corporation

The recent shortage of drill operators in the horizontal directional drilling (HDD) industry, has not gone unnoticed by Vermeer Corporation which has introduced an intensive HDD operator training program called HDD Circuit™.

The HDD Circuit training program is a tuition-based, instructor-led program providing a mix of classroom time and hands-on experience in a small-group learning environment. During each two-week course, students will be exposed to topics on HDD safety, jobsite evaluation and setup, drill operation best practices, underground utility locating, and potholing best practices, drilling fluid mixing and testing, proper bore and pullback techniques including the development of a bore to plan, as well as basic drill maintenance and inspection.

"We have heard a consistent message from underground contractors that they are having difficulty completing work due to a lack of qualified drill operators. With HDD Circuit, Vermeer is working to help grow the industry with trained operators," said Tony Bokhoven, Lifecycle training manager at Vermeer. "We are working to cultivate a pool of potential drill operators that will make HDD a career to help fill the positions available today and into the future."

The goal of the training program is that each student who successfully completes the program will be able to be a productive drill operator or crew member. Students must complete and pass a written test and hands-on evaluation to pass the program and receive a certificate of completion.

"We recognize that not every ground condition or every situation a drill operator may face in the field will be present during the training," said Dave Wisniewski, vice president, Underground products at Vermeer. "What we're teaching them is how to fundamentally be an operator, so they start to know what to look for, what to feel for, and how to properly handle situations."

The training is being offered to contractors who can select and send their current employees to the HDD Circuit training program. MasTec - a leading infrastructure construction company - is taking advantage of the program; eight employees who have been with the company for a period of 12 months, just completed the two-week core HDD module. "The MasTec Utility Services Group was thrilled to be a part of the HDD Circuit training pilot because programs like this are very well aligned with our mission to provide world-class training to our employees," said John Congemi, director of employee development for MasTec. "Our partnership with Vermeer will play a vital role in our long-term directional drilling and locating training strategy."



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Oklahoma's Food-Grade Gypsum

Compiled by Amy White *WorldWide Drilling Resource*[®]

Oklahoma leads the country in gypsum mining. Big deal, right? Actually, it is a very big deal, especially if you're a fan of Twinkies and beer. *The Oklahoman's* Mike Coppock explained:

The next time you bite down into a Twinkie, know there is a good chance part of it was mined out of a mesa south of Little Sahara State Park. The same goes for the beer you may order...or the loaf of bread you buy at the grocery store... gypsum in Oklahoma is so pure that it is used as a calcium additive for foods we take for granted and in common medicines.

Technically speaking, gypsum is a naturally-occurring hydrated salt of calcium and sulfate. It is an abundant mineral formed millions of years ago due to the evaporation of shallow seas which once covered Oklahoma.

Over five million tons of gypsum are mined annually in the state involving 22 companies spread across seven western counties. Major County is the number one source of gypsum in Oklahoma, producing more than 1.7 million tons annually.



Natural gypsum formation, courtesy of the Gypsum Association.

Typically, gypsum is mined in an open-pit quarry. The process is similar to that of many other rock quarries. First, exposed gypsum is fractured by drilling and blasting; then the fractured gypsum is loaded into trucks and transported to a processing plant.

The chemical and physical properties of gypsum make it a valuable part of our everyday lives in things like canned vegetables, baked goods, and beer. Not to forget the mineral's importance to our furry friends, gypsum is also used to make pet and animal food.

Although Oklahoma sees tons of gypsum removed from the ground every year, Stan Krukowski with the Oklahoma Geological Survey said there is no concern about the state running out any time soon. Twinkie and beer lovers can rest assured.

LAS VEGAS DEALMAKERS

SEMCO, Inc.



Jeri from SEMCO, Inc. of Lamar, Colorado, helped David and Jennifer from Dr. Well of Fair Oaks, California, with their new S6000 SEMCO pump hoist.

GEFCO, Inc.



Tom (C) with B&B Well Drilling of Laton, California, was delighted to stand by his new GEFCO 50K rig with Jon and Charlie of GEFCO, Inc., an Astec Industries Company of Enid, Oklahoma.

Hunke Manufacturing, LLC



Gerald of Hunke Manufacturing, LLC, of Snyder, Nebraska, with Leonard and Rick of C.J. Hammer Pumps & Machinery Co. of Visalia, California.



Jeri from SEMCO, Inc. of Lamar, Colorado, stands with proud \$30,000 SEMCO pump hoist owners Matt, Deb, Casie, and Jason from Tanner Well Service LLC, of Sierra Vista, Arizona.



Mud Technology International, Inc.

John with Mud Technology International, Inc. of Athens, Texas, congratulates Steve of Steve's Pumps & Well Drilling, Inc. of Janesville, California, on the purchase of a new Mud-Tech RST 1400.



Women and the Energy Workplace

Compiled by Amy White, Associate Editor
WorldWide Drilling Resource®

A few decades ago, the oil business was a lonely place for the relatively few women choosing to work in the sector. In recent years, however, the tides have begun to change. Women have more career opportunities in the oil and gas sector than ever before, including not only highly-specialized positions in engineering and geophysics, but also entry-level technical jobs which are increasingly attracting women to the evolving workforce.

Major industry players are taking notice of the changing energy workplace. "We want women to know that the oil and gas industry has made tremendous strides in recent years, and that it offers opportunities not provided by other sectors," said Kirsty Bashforth, group head of organizational effectiveness for BP.

A survey released by the American Petroleum Institute (API) last year revealed women account for just 19% of oil sector jobs in the U.S. - compared to 47% of jobs in the country's overall workforce. Richard Keil, senior media relations adviser for ExxonMobil, voiced concern about this scenario. He said ExxonMobil hires numerous engineers and scientists; in the future, the company aims to fill more of these positions with women. The oil giant hosts "Introduce a Girl to Engineering Day" every year and sends its female engineers and scientists to middle schools where they reach out to young girls as mentors and instructors. It's all part of gaining the interest of female students and encouraging them to take more math and science classes at the high school level in preparation to study engineering in college.

The API survey also outlined possible solutions to barriers faced by women in the oil and gas industry. One in five respondents strongly agreed gender-based discrimination occurs within the industry. Societal conditioning, lack of qualified candidates, and family care responsibilities were cited as the most significant obstacles to increasing the proportion of women. Putting STEM (science, technology, engineering, and math) programs into action in schools; offering flexible work accommodations; and reenforcing company goals to encourage more gender balance were proposed as the most influential ways to foster female representation.



Image courtesy of macegroup.com

Regional Colleges in the U.S. are offering new options for women interested in working for the demanding yet rewarding oil and gas industry. In fact, degree programs designed specifically to appeal to women are helping females land jobs immediately upon finishing classes.

An energy career can be a winning endeavor for anyone. The industry offers excellent professional pathways to draw and keep talent; exceptional international career opportunities; challenging issues to solve; and above-average pay. As regional colleges continue attracting women to oil and gas programs, the number of women employed in the sector is expected to rise. Across the United States and the rest of the world, where there's a need for oil and gas workers, women are becoming more and more prepared to fill the gap. New skills are enabling them to reinvent their lives and communities, as well as the oil patch.

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The "Idiots" Corner

by "Billy Bob Smith"

We are past the holiday season and the close of another year, so I thought I would share some of my biggest pet peeves. Whiners, complainers, and finger pointers - I have had enough of you people to last several lifetimes. Get over it!

I heard a couple last week complaining about waiting on hold for several minutes to solve a simple problem with their Internet connection. Did you know that every day 1500 children in the world die of starvation?

A man at the bookstore last night gave the person behind the counter heck because his coffee was too hot. Did you know every year millions of people lose something of significant value to them due to natural disasters?

A few weeks ago, a lady was arguing with her husband about where he put her keys. Did you know 48,000 people die every night while they are sleeping?

Over dinner last week, one of my friends was complaining about how his business was struggling; and I overheard a neighbor whining about the weather. Did you know there is only one group of people worldwide who don't have weather? They are all dead.

Folks, I could go on for pages with this stuff, but I don't want to sound like I am whining about whiners, so I'll just close and wish you a happy and successful year. Oh, do me a favor and deal with it, get over it, handle it. But before I go - got a whiner in your life? Got a whining customer or employee? Got a whining spouse? Well, I won't tell you what to do, but I will say these people will always find something to complain about.

"It is better to keep your mouth closed and let people think you are a fool than to open it and remove all doubt."

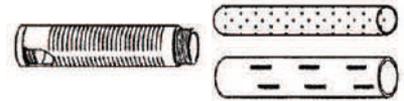
~Mark Twain

Billy Bob

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Where are you planning to go?

How about including these shows:

Are you ready for the Annual Michigan Ground Water Association (MGWA) Convention? *WWD* is! This 88th event is at the McCamly Plaza Hotel/Kellogg Arena in Battle Creek, Michigan, March 3-4.

After registration on Thursday, there is the Board of Directors meeting, updates from both the Department of Environmental Quality and Department of Transportation, and the McElhiney Lecture. An outing is also scheduled for the auxiliary members. Later that evening, is the banquet, scholarship auction, and casino night.

Friday has the MGWA Annual Meeting and auxiliary luncheon. The trade show will be open with demonstrations from vendors. Don't miss it! [Go to www.michigangroundwater.com](http://www.michigangroundwater.com)



The Pipeline Safety & Awareness Symposium is the 2016 Common Ground Alliance Excavation Safety Conference & Expo being held March 8-10, at The Mirage in Las Vegas, Nevada.

WWD encourages oil and gas professionals to come together to learn how to better protect pipelines and the public. "Be the Solution. Save a Life." says it all. The event brings value to education, and awareness of industry initiatives with over 50 conference sessions, workshops, and networking functions. More than 100 exhibits will showcase new technology, some even with demonstrations. [Register at www.thepipelinesymposium.com](http://www.thepipelinesymposium.com)

March 11-12, are the dates to remember for the New England Water Well Expo. The Best Western Royal Plaza Conference Center in Marlborough, Massachusetts, is the place.

Friday, sit in on the seminars for helpful information on a variety of subjects. The trade show preview is in the afternoon, then it's family fun night! Just a little friendly competition to keep things interesting!

Saturday, there's more education opportunities, plus you can catch up with old friends as you stroll through the exhibits from water well product manufacturers, distributors, and service providers. *WWD* will be in attendance! [More info can be found at www.newwassoc.org](http://www.newwassoc.org)



Looking for show pages? You found them!

ON THE TRAIL...

Red Jackets ~



Click on the photo above to enter the 2015 Ohio Water Well Association Annual Convention & Trade Show Photo Gallery.

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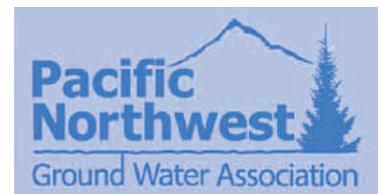
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Every two years, members of the Alaska, Idaho, Oregon, and Washington state associations meet for the Pacific Northwest Ground Water Exposition. The 2016 show is March 18-19, at the Red Lion Hotel on the River in Portland, Oregon.

Gain insights from speakers focused on the needs of the groundwater industry in the region. See *WWD* in the exhibit area with other service providers, manufacturers, and suppliers showcasing the latest products and equipment, and network with fellow professionals in a relaxed setting.



Visit www.pnwgwa.org

See more events online at worldwidedrillingresource.info/Planning1.pdf

A QUICK STOP DOWN SOUTH

by Mary Lynn Mixson, Representative, *WorldWide Drilling Resource*®

It was fall, but in the South, September still brings hot temperatures with plenty of humidity. *WWD*'s CEO and Managing Publisher Ronnie Jones and I were on a public relations trip, and we had planned our route to visit long-time customers, as well as prospective ones. We left Florida the day before, so after leaving the Atlanta South RV Resort with the Work and Play in tow the next morning, we headed straight for Simmons Manufacturing Company. It wasn't long before we pulled off Route I-75, parked the Suburban, and performed a quick safety check of our motorized chariot.

Simmons Manufacturing Company is located in McDonough, Georgia, which is about 30 miles south of busy Atlanta. When we walked in the front door of the building we received a true Southern Hospitality Welcome. Someone said, "We haven't had a visit from anyone with a camera for 30 years!" Of course, when the Simmons crew saw the red shirts and camera, they knew we couldn't leave without getting at least one group shot of everyone there. Just like every *WWD* Team member, Simmons employees know the best customer service, product quality, and total value are vital to our mutual success.

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We at *WWD* certainly enjoyed stopping by to surprise the staff at Simmons Manufacturing Company and would love to extend an open invitation to any of our friends in the drilling industry. If you happen to be on your way through the panhandle of Florida, don't forget to stop by. We'd love to see you too!



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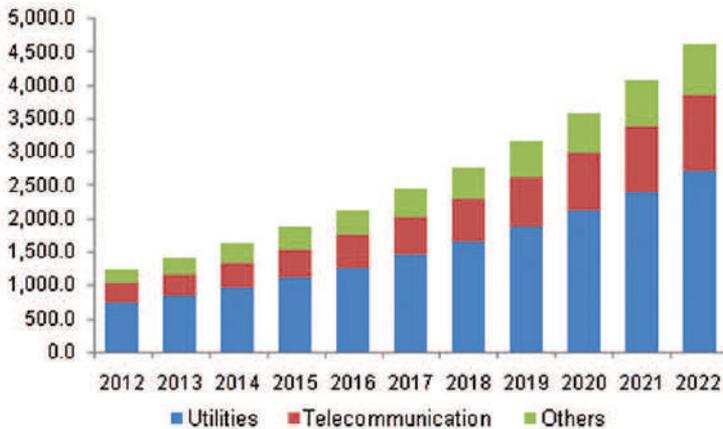
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Utilities Industry Could Boost HDD Market

Adapted from a Grand View Research Report

According to a new report by Grand View Research, Inc., the global horizontal directional drilling (HDD) market size is expected to reach \$14.95 billion by 2022. The HDD market was estimated at \$5.12 billion in 2014; however, the growth within the telecommunication industry and increased prominence of the environment-friendly trenchless technology are expected to increase demand.



With the advancement of telecom technologies such as 4G and 5G, the demand for cellular towers and transmission systems has increased, and this demand is expected to increase the usage of HDD. With more people needing faster and secure means of voice and data transmission, as well as the increasing rate of urbanization, directional drilling has grown in the telecom segment.

Additionally, power and gas companies are seeking innovative ways to reduce the distribution cost and increase for installation of conduit and pipelines without the need for deep excavations.

The report also highlighted the challenges of meeting the demand with a lack of skilled operators and contractors with HDD experience. Operators must be skilled to select drill heads, reaming devices, and drill fluid compatible with the conditions encountered on the job. However, such

skilled operators are difficult to find, causing contractors to turn to experienced rotary drill operators and providing them on-the-job training to qualify them to operate the horizontal directional drill equipment.

HDD technology is also an integral part of pipeline construction projects. It provides environmental and economical solutions for crossing underneath rivers and traffic ways, flood protection dams, foundations of buildings or infrastructure objects, and topographic obstacles such as mountain zones, non-crossable terrains, nature reserves, orthogonal situated hills and rims, parks, city areas, and rock ridges.

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The Un-Comfort Zone II

by Robert Evans Wilson, Jr.

**Is Motivating with Fear a Bad Idea?
I led with intimidation and...
wow...did it backfire!**

"Bobby, you gotta help us."

"What's up?" I asked the three scouts

who stopped me on the trail to the lake.

"It's Benjy. He pulled a knife on us," replied one kid.

"A really big knife," added another.

"Yeah, big like a sword," said the third.

"What do you mean, he pulled it?" I asked.

"He pulled it out of its sheath, and threatened us with it."

"And, he poked it at us, and said he'd cut us."

"And what did you guys do to provoke this?"

"Nothing, he's trying to act tough, but he's scaring us."

"And, we're not the only ones, he's done it to several other kids."

"Why don't you tell the Scoutmaster?" I asked.

"We don't want to rat him out and get his knife taken away.

We just want him to stop, that's why we're telling you."

I was 14 years old, a patrol leader, and one of the older scouts on a weeklong camping trip. "OK, I'll talk to him."

That afternoon, I stopped by his tent. "Hey Benjy."

"Hi Bobby, what's up?"

"I hear you've got a new knife."

"My mother got it for me to bring on this trip. You wanna see it?"

"Sure."

He showed me a brand new bowie knife; it had a gleaming eight-inch blade, with the handle it was nearly a foot long. "Wow; it's a beauty," I said.

He started slashing the air with it like a sword fighter in a movie. "If anybody messes with me, I'm gonna cut 'em good." In his hand, it did look like a sword. He was the smallest scout on the camping trip, and maybe the smallest in the troop (by contrast, at six foot two inches, I was the tallest). I suspected he'd been bullied, if not by his fellow scouts then surely in school.

"Benjy, you look cool with that knife, but you're scaring the other scouts with it," I told him.

"I'm just letting them know not to mess with me - that's all."

"No one is going to mess with you. Seriously, you've got to stop, they think you're trying to hurt them."

"Okay, Bobby."

After dinner that night a contingent of seven boys came by my tent. They were all talking excitedly at once, but it boiled down to: "Benjy is still threatening kids with his knife."

"I'll take care of it," I told them.

I thought I was so clever. I still didn't want to rat Benjy out to the adults, so I waited until he was asleep that night. Then by the light of the moon, I yanked him out of his sleeping bag, lifted him up over my head, and pinned him by his shoulders to the trunk of a nearby tree. Then in the most menacing voice I could muster said, "I thought I told you to stop scaring people with your knife? Well, you're going to stop or I'm going to make you stop. If I hear of you pulling your knife on one more person, I'm going to take it away from you, and throw it into the deepest part of the lake." He was scared. "Do you hear me?"

"Yes," he whimpered. I put him down, and left. I believed I had achieved my goal; I had intimidated him into no longer threatening people with his knife. Boy was I wrong.

Early the next morning I was awakened by the Scoutmaster and every adult leader on the camping trip. I was immediately stripped of my rank as patrol leader, and ordered to move my cot to the kitchen tent for the remainder of the week. I was shamed and humiliated. They were not interested in my side of the story. They made it clear I had overstepped my authority.

In retrospect, I'm glad Benjy told the Scoutmaster I scared him. If he had not, I may have come to believe that using fear and force were legitimate methods for handling problems. As a result, I've learned more peaceful methods that consider the feelings and needs of others. It was the last time I ever used fear as a motivator.

Robert

Robert is an author, humorist, and innovation consultant. He works with companies that want to be more competitive and with people who want to think like innovators.

For more information on Robert, visit www.jumpstartyourmeeting.com or contact him via e-mail to michele@worldwidedrillingresource.com

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TRASH TO TREASURE

Compiled by Amy White, Associate Editor
WorldWide Drilling Resource®



Every person in the U.S. produces an average 4.5 pounds of waste each day. Most of it is managed in municipal solid waste (MSW) landfills across the country. When MSW is initially deposited in a landfill, it mixes with oxygen in the first decomposition stage, generating a relatively small amount of methane. Within a year's time, an oxygen-free environment is normally established and bacteria starts to decompose the waste, generating more methane.

Landfills often burn off produced methane in a flare system, but some use the gas to create energy. By drilling a well into the trash dump to extract methane, landfills have an option to sell it as fuel, or landfill gas (LFG).

LFG collection typically begins after a portion of the landfill (known as a "cell") is closed to additional waste. The sensitive extraction process requires drilling wells into landfill cells for methane removal and transport. The most common method of LFG collection involves drilling vertical wells. A drill rig creates boreholes - at least 24 inches in diameter in most instances - in a landfill to remove trash and make way for a well screen and casing to be installed.

Older trash is located at the bottom of the landfill; thus, increased depth equates to increased methane concentrations. It is not uncommon for boreholes in landfills to be drilled greater than 100 feet deep. Crews must monitor the depth closely to make sure the landfill's lower liner or bottom seal is not punctured. The installed well includes a slotted or perforated well screen with a cap on the bottom and solid casing to the surface. Total depth of the well and length of the well screen are determined by the location of the methane accumulation.

Organic content of the MSW is a significant consideration. Waste composed of high organic content will generate more LFG than waste with lower organic content. For example, construction and demolition landfills are not expected to create large amounts of LFG, and are usually not viable for an energy generation system.

The U.S. Environmental Protection Agency (EPA) has identified close to 2400 active or closed MSW landfills in a national database. Approximately 595 of these have one or more LFG projects in operation, resulting in a total of 645 active sites. Over the last 20 years, more than 1800 megawatts of electricity have been generated by LFG in the U.S. EPA suggests as many as 440 additional landfills could convert methane to an energy resource in a cost-effective manner to power nearly 512,000 homes across the country.

An estimated 75% of currently operational LFG projects in the United States use methane to generate electricity. Power for on-site use or sale to the grid can be produced with a range of technologies, including internal combustion engines, turbines, microturbines, and fuel cells. Most projects use internal combustion engines or turbines, with microturbine technology being used at smaller landfills and in niche applications.

An estimated one third of LFG projects directly use landfill gas in boilers, dryers, and kilns, among other uses. Industries such as auto manufacturing, wastewater treatment, consumer electronics and products, paper and steel production, prisons, and hospitals use energy from landfill gas. Companies currently utilizing this energy include BMW, SC Johnson, Tropicana, Ford, Dupont, Honeywell, Sunoco, General Motors, Fujifilm, Stouffers, Anheuser Busch, Frito-Lay, and many more.

One million tons of MSW can produce 432,000 cubic feet per day of LFG, and continues producing LFG up to 20 or 30 years. Currently, Houston-based Waste Management and Arizona-based waste disposal firm Republic Services own the majority of the nation's LFG facilities. An EPA proposal to govern emissions at existing landfills will be released in August 2016.

This chart from the EPA shows the number of operational LFG projects in the U.S., as well as candidate landfills by state.



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DEFYING THE NORM

*Adapted from an Article
by Mary Herrick
Appearing in World Vision Magazine
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When a village in Africa receives a well providing clean water, it's often women and children, who have spent hours every day carrying water, who benefit the most. But it is usually men who design and build the water systems.

In Mali, Lucie Bibata Dembele is breaking those norms. Lucie manages two of World Vision's drill rigs, as well as teams of 12 men who run them. She is the only female drill rig manager for World Vision, not only in Mali, but in the entire West Africa region.

"I think my role is important because women can see another woman who fights for them. That can give them courage in all their activities, whether domestic or financial. For that, I know my effort will not be in vain," said Lucie.

With a bachelor's degree in geology, Lucie originally planned to go into mining. Instead, she chose to pursue drilling for water, because the reality of bringing clean water to those in need is more meaningful to her. In fact, this is the part of her job that inspires her the most.

On average, it takes 2.7 days for one of World Vision's rigs to reach a depth of about 197 feet, which provides an appropriate flow of water, resulting in a successful borehole and well. During the operation, drilling teams stay in communities where they're working, often in basic conditions. Days are long, and travel from one site to another can be rough. It is a physically demanding job, and crews are often exposed to diseases which are endemic in rural areas. When she was interviewed for this article, Lucie was recovering from typhoid and malaria.

Communities where Lucie works are often surprised to see a woman leading the drilling team, and she sometimes receives questions and criticism. "There are women who think my work is too hard to do, given the need to spend months away from family," she says. "Others think it is not 'woman's work.'"

Even with these challenges, Lucie says for her, one of the hardest parts of the job is when the rig doesn't hit water. It's a challenge to face the disappointed community and to move the rig to a new location. In these cases, World Vision's hydrogeologist resurveys whether there are other locations nearby for drilling.

Since becoming a drill rig manager with World Vision, Lucie has learned how to operate drill rigs and how to manage a team of men. "It's not complicated. I consider them my brothers. I respect them, and they respect me," said Lucie. "There are people on the team who I can learn from; some with more than ten years of experience. If I don't know something, I just ask. Everyone is here for the same purpose."



Lucie Bibata Dembele celebrates when a World Vision drill rig hits water in Mali. Photo courtesy of World Vision.

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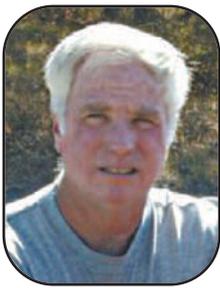


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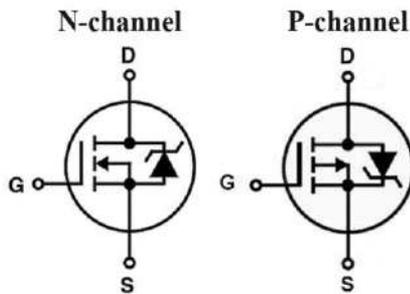


The "Switch" that Changed the World

by Britt Storkson
Owner, P2FlowLLC

it. When the switch is turned off, current does not flow through it. It's that simple, just like the switch that turns on and off the light in your bathroom. While still switches by definition, the switches a computer uses are a little different.

For one thing, computer switches are very fast - so fast most can be turned on and off billions of times a second. Another is they switch tiny amounts of current. In a computer, it's usually something like nano-amperes, with nano meaning "billionth" or "billionth" of an amp. A typical computer "switch" is diagrammed below:



"D" Terminal = Drain "S" Terminal = Source "G" Terminal = Gate

While it may look complex, it's really quite simple. Here's how it works:

For the N-channel part, a voltage placed on the Gate terminal allows current to flow from the Drain to the Source terminal. In other words, the part goes from a high resistance to a low resistance, which allows current to flow.

For the P-channel part, the Gate terminal is brought to ground (0 volts), allowing current to flow from the Source to the Drain terminal.

These "switches" are used to "retain" voltages that create computer memory. Computer memory is nothing more than voltage or no-voltage states. If there is adequate voltage there it's called a logic 1. If there is no voltage there it's called a logic 0.

There are several types of memory. Volatile memory is memory which is not retained after the power is removed and reestablished. Nonvolatile memory retains its electrical state even after the power is turned off. Regardless of the type of memory, the function of retaining voltage states is the same.

Electronic parts often have thousands of these "switches". They are cheap, fast, and reliable. They have to be or they would be of little use to us. So when someone complains about how complicated their computer is you can assure them deep down inside the computer, things are really quite simple.

Britt

Britt Storkson may be contacted via e-mail to michele@worldwidedrillingresource.com



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by Kyle Rehme

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Kyle Rehme uses his personal knowledge of the water well, drilling, and environmental industries to provide customers with practical insurance solutions.

preventing claims - is much more important than shopping for a higher dividend.

Understanding the elements contributing to your worker's comp costs - Your classification codes, experience modification, sudden company growth, or company acquisitions can all affect your premiums. It's important to know the impact each brings to your overall workers' comp pricing. This is something your agent should be discussing with you on a yearly basis prior to renewal.

Orient and train employees - This is a crucial step, especially now in a tight employment market. How you train and encourage new employees in safe working practices will determine your insurance costs in the future. During orientation, you'll find many employees resist asking questions. To counter this reluctance, use checklists and fill gaps by explaining in detail what you expect. At the end of the training course, ask them to sign the checklist to confirm they understand, and have been instructed in, the company's safety procedures. This signed checklist should become part of the employee's permanent record.

Put your policies into practice - If you don't have safety policies, then develop and use them. Review your claim information: do the same employees and injuries show up year to year on your claim reports? If so, are your employees properly trained and do they understand safety procedures?

Report claims immediately - Statistics reveal for every week a claims goes unreported, costs increase dramatically, as much as 50%. When employees delay reporting an injury, find out why. Your goal is to get employees to report injuries, not judge whether or not an injury is important enough to report.

Investigate the causes - Even after a claim has been paid, the incident is not over until you discover its cause. While one injury is behind you, others will take its place unless you reduce the chance of the incident reoccurring. Assign the task of correcting the problem, both short and long term, to your safety committee, supervisors, or managers, Ask for reports and proposed corrective action. Always ask the injured employee how the injury could have been prevented, and do so while the event is still fresh in his or her mind.

Kyle

Kyle Rehme may be contacted via e-mail to michele@worldwidedrillingresource.com

For many years, it's been a buyer's market: employers have saved on workers' compensation (comp) costs by relying on large dividends. However, the market has turned and dividends have declined sharply. You can't control the market, but you can control premiums by minimizing your losses.

The only way companies really control their workers' comp costs is to convince all involved that controlling costs is worth the effort. Companies which have made the greatest strides do so because everyone is focused on the importance of safety. Your internal strategy - which centers on

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It's Time for the 2016 Geothermal Design Challenge

Adapted from Information by the U.S. Department of Energy

The U.S. Department of Energy Geothermal Technologies Office, in partnership with the Center for Advanced Energy Studies and Idaho National Lab, is recruiting students in graphic design, communications, science, and/or engineering to bolster their portfolio, resume, or college applications by entering the 2016 Geothermal Design Challenge. They are looking for smart and creative student teams to design an infographic to illustrate how geothermal energy is clean, safe, reliable, and sustainable. Students can participate in one of two brackets - high school and university.

The 2016 Geothermal Design Challenge theme is: What is the future of geothermal energy? How will it impact you?

Students are asked to form teams of two to three members and are encouraged to find a team sponsor, especially for the high school bracket. A good skills mix includes academic, graphic arts, and communications. High school and university (both undergraduate and graduate students) students can participate in the challenge.

Projects will be judged on the following four areas:

- Research content: accuracy, references provided for facts, logical flow, and clear analysis.
- Design Aesthetics: easy-to-understand data visualization, appropriate graphics.
- Communication: compelling story and unique page views during social media campaign.
- Innovation: unique story, emphasis of new insights, compelling to a broad audience.

Winners receive:

- Top finalists will receive recognition with official certificates.
- First place prize of \$2500 in both the high school and university brackets.
- One grand prize (selected from either bracket) of \$2500 and an all-expense paid trip to the Geothermal Resource Council 40th Annual Meeting October 23-26, 2016, in Sacramento, California.
- The grand prize winner will showcase their work and learn about cutting edge advances & career opportunities in geothermal energy.
- Selected infographics will be posted on Department of Energy sponsored Web sites as a national promotion.



The challenge will consist of three rounds.

- Round 1: Create an infographic (must be submitted by March 1, 2016).
- Round 2: Refine and perfect an infographic (May 15, 2016, deadline).
- Round 3: Develop and execute social media campaign to promote your infographic (the campaign must be executed from July 1, at 5 p.m. central time through July 14, at 5 p.m. central time - deadline is July 15, 2016).

Winners will be notified by August 1, 2016. For more information, visit www.caesenergy.org

A problem well stated
is a problem half-solved.
Charles Kettering

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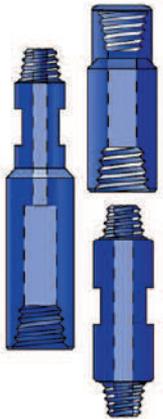
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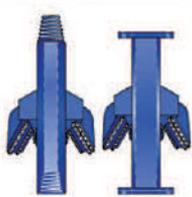


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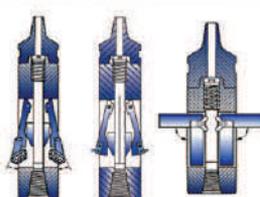
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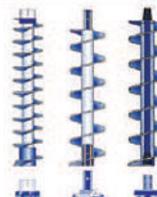
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Oilfield Chemicals Industry on the Rise

Adapted from Information by Markets and Markets

According to a recent Markets and Markets report, the market size of oilfield stimulation chemicals is projected to reach \$2.97 billion by 2020, signifying a growth rate of 10.1% between 2015 and 2020.

The rapid expansion of shale gas and oil reserves in North America is leading to significant changes in the oilfield chemicals market. Current advances in horizontal drilling, hydraulic fracturing, availability of water, and mineral rights licensing are contributing to the rapid development of shale gas and oil reserves in the North American region. This is driving the growth of the oilfield stimulation chemicals market. There is significant increase in the activity level

across all oilfield chemical sectors such as drilling fluids, cementing, stimulation, and production chemicals. This increasing activity in shale oil and gas reserves has also resulted in consumption of higher volumes of drilling and cementing chemicals.

Time for a Little Fun!

Can you identify which ads in this issue these two photos came from?

Congratulations to:
Emily Hampton
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Photo of wellheads hooked up in preparation for a hydraulic fracturing operation at a drill pad in the Fayetteville Shale gas play in Arkansas, courtesy of the United States Geological Survey, by Bill Cunningham.

icals, such as friction reducers, corrosion and scale inhibitors, and others, are also projected to grow at a considerable rate in the near future.

The U.S. and China are at the forefront, while Canada, Mexico, Poland, and Germany are the other key markets for oilfield stimulation chemicals consumption.

Although North America is projected to remain the largest regional market for oilfield chemicals, the Asia-Pacific region, led by China, is likely to overtake North America as the fastest-growing market. China's massive demand for energy is likely to drive the country's exploration activities and development of its huge unconventional energy resource, especially natural gas. China is followed by Indonesia, India, and Malaysia, where consumption is growing at a steady rate.

Among the various important product types of oilfield stimulation chemicals, gelling agents dominated the market with 34% in terms of value of the total oilfield stimulation chemicals market share in 2014. Surfactants are another key product segment, which is projected to grow significantly between 2015 and 2020. Other product types of oilfield stimulation chemicals,

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3230DT

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The 3230DT may be the most versatile machine Geoprobe Systems® has ever designed and manufactured. Big statement, but we think we've got the facts and feedback to back that up.

The Geoprobe® 3230DT is a mid-sized tracked drill rig combining advanced direct push functionality with traditional geotechnical auger rig and high-speed rotary drilling capabilities. All of the features of the 3230DT come together to create a rig that's as efficient as what it does. You may not use all of the functions on every project, but if you need to auger to bedrock and then do a confirmation core, it's all there ... in one rig. It transitions from direct push to wet rotary drilling in less than five minutes!

But what good is all that if you can't operate the machine? No problem here. This rig is "simple to run" and "very easy to learn," according to Buford Collier, Senior Project Manager for C&S Consulting in Kilgore, TX. He invited a consultant friend over to a jobsite while he was doing some geotechnical drilling. "This guy had never drilled a day in his life," he said. "After I spent about 15 minutes telling him about the controls, he worked with the machine nearly two hours as I called out instructions while I worked with the tooling. It was like a 'play day' for us! It's fun to run."

Fred McKay, Drilling Division Manager for EnviroTek in Tampa, FL, reports that they've increased their capabilities by five times. "We've been going through a formation that's high in clay, phosphates, and limestone. It's compressed and it's dense," Fred said, "But our 3230DT is going right through it." His field team is enjoying the rig. "We got up-to-speed on it really fast; it's easy to use."

"This is a great rig, and we're really pleased," Buford added, "but no one can beat your [Geoprobe®] support! I knew that going in to this machine purchase. I've run other drill rigs in my life, and no one treats us as good as you guys!"

Interested in a demonstration of the 3230DT? Call us today and we'll start planning a road trip!



A new Geoprobe® 3230DT direct drives 6.0-in. casing with a removable solid point prior to installing a 2.0-in. well. During the well installation process, the operator will use numerous features of the rig including the GH70 percussion hammer, the swing-arm control panel, and hydraulic clamp with 80,000 lbf pull force.

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Water for Life International

by *Tim Rasmussen*

Thursday morning November 12, 2015, brought good weather for loading the container in Bartholomew's yard and shop in Spokane. The container was scheduled to

be at the shop at 8 a.m. for loading, and by that time, ten or so men had gathered to do the hard work of loading the shipment to Guatemala.

By 8, there was no word from the driver, so Gary called the trucking company. He was told there had been a delay getting a high-cube container, but they had secured one and would make sure it would be there at 8 a.m. the next day. There was nothing to be said or done about it. A quick poll revealed there would only be four or five men able to be there the next day.

It was a good thing we had palletized and staged as much of the cargo as we had, but the delay was going to make the loading much harder for the fewer number of men who could be there.

Friday morning before 8, the driver called. He was within minutes of the shop and headed our way. The GPS is confused here, so Gary sent Frank Clark to meet him and guide him to the shop. The driver didn't speak English very well, but he could drive the truck okay, and he backed up to the door.

The loading took 3½ hours. Most of it was done by forklift to the back of the container and then with pallet jacks to the far end. By using a high-cube container, we can stack one pallet on top of another. We have several pallets of bentonite, a pallet of hand pumps, spools of wire cable, a large generator, 20 or so sticks of steel pipe casing, and crate after crate of medical equipment and supplies for the Government Hospital. One of our supporters had loaned us a pallet scale, so we were able to say with accuracy how much weight we were putting into the container. It has been guesswork before.

At 11:30 a.m., the doors were shut and the paperwork about to be signed and exchanged. At that point the driver said he did not have a seal for the doors. They are for sale in truck stops, and every other time we had ever sent a container, the driver had the seal and sealed it in our presence with the numbers noted. Gary thought it wise to purchase a seal before sending the driver on his way with our supplies, so he guided the driver out to the freeway and got a seal. The cargo we had collected all year was on its way.

I checked on the Mediterranean Shipping Company (MSC) Web site and saw the container was gated into the dock on the 14th and was scheduled to be shipped on the *Lisa*, an MSC container vessel, on Wednesday the 18th. May the Good Lord watch over the shipment of material necessary to bring the blessing of clean water and better health to the people of rural Northeast Guatemala.

If you would like to help, contact Gary Bartholomew at 509-466-5075 or 509-939-1941

Tim

Tim Rasmussen may be contacted via e-mail to michele@worldwidedrillingresource.com

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Frequently-Used Geological Terms Part 47

Glossary Adapted from the Dictionary of Geological Terms

M

Medium-Volatile Bituminous Coal - Bituminous coal, characteristically clustered, containing 23-31% volatile matter, analyzed on a dry, mineral-matter-free basis.

Megashear - A strike-slip fault with a horizontal displacement exceeding the thickness of the crust significantly.

Megatectonics - The tectonics of the very large structural features of the earth.

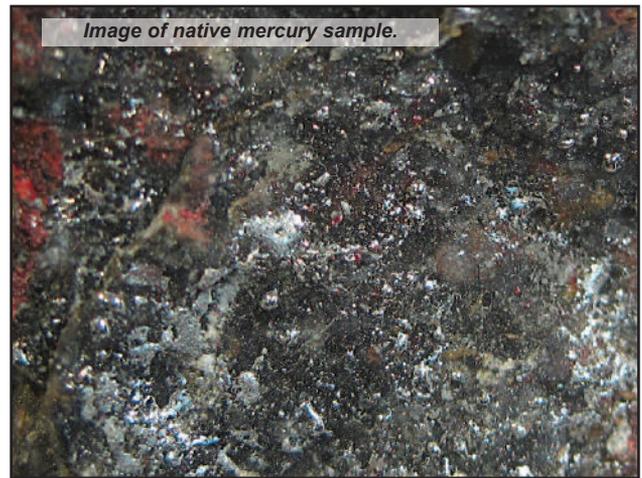
Melanocratic - Dark colored; applied to igneous rocks containing more than 60% mafic minerals (minerals high in magnesium and ferric oxides).

Melilite - A group of minerals consisting of an isomorphous solid solution series and may contain some iron. It occurs as a component of certain recent basic volcanic rocks.

Mercalli Scale - An arbitrary scale of earthquake intensity ranging from 1-12. It is named after Giuseppe Mercalli, an Italian geologist who devised the scale in 1902.

Mercator Projection - A map projection in which the equator is represented by a straight line true to scale, the meridians by parallel straight lines perpendicular to the equator, and the parallels by straight lines perpendicular to the meridians and the same length as the equator. There is great distortion of distances, areas, and shapes in the polar regions because any line of constant direction of the sphere is truly represented on the projection by a straight line. The mercator projection is of great value in navigation and is used for hydrographic charts and to plot trajectories of earth satellites in oblique orbits.

Mercury - A heavy, silver-white to tin-white hexagonal mineral. It is the only metal that is liquid at ordinary temperatures. Native mercury is found as minute fluid globules disseminated through cinnabar (the primary ore of mercury), or deposited from the water of certain hot springs. It usually contains small amounts of silver and combines with most metals to form alloys. It is highly toxic if breathed or ingested.



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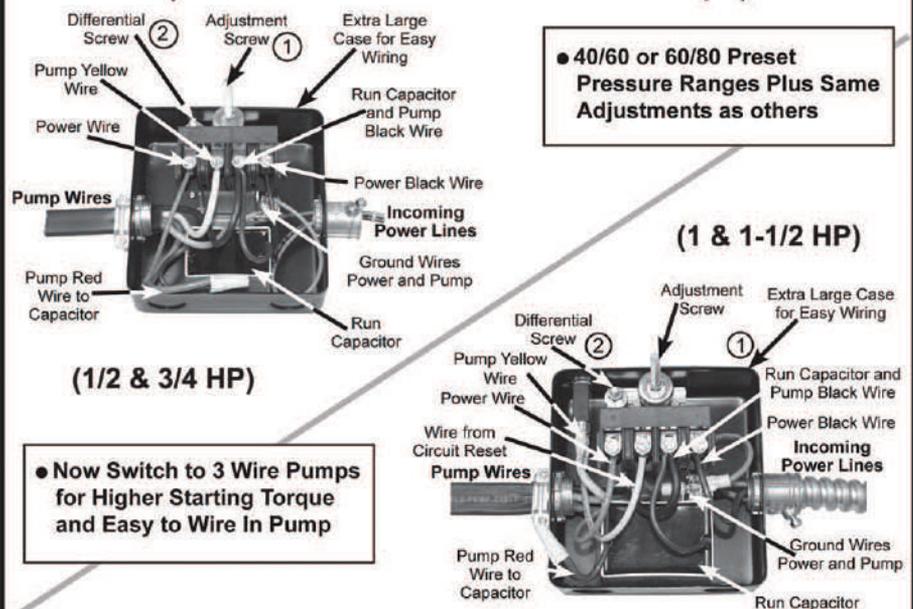
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THE ROSE-WALL MFG, INC. EXPERIENCE

by Mary Lynn Mixson, Representative

WWD's Team pulled into the parking lot of the Rose-Wall Mfg. Inc. facility in Greenfield, Indiana, in September with camera ready. President Ted Rossell and son, Vice President Brad Rossell, were busy at work when we walked through the door. Ted began giving us a tour of the 12,000-square-foot facility, which included the paint and sandblast shop, fabrication area, and a couple of offices. He reminisced about the history of the business, which began in 1985 with partner and local well-drilling professional Chuck Wallace. The partners merged their experiences in sheet metal and well drilling, and Rose-Wall Manufacturing was incorporated. From the beginning, the company was focused on manufacturing quality water tanks to sell at affordable prices, coupled with great customer service. This tradition has continued, even though Chuck sold his portion of the business in 2000.



Ted and Brad Rossell continue to build a family-owned business on a tradition established in 1985. *WWD* photos.



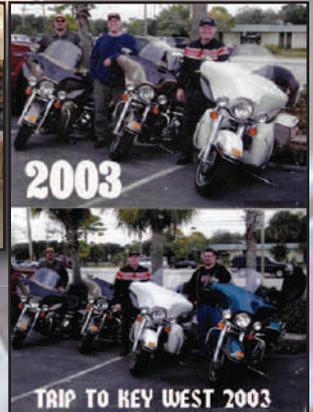
Rose-Wall builds custom equipment for the well drilling industry.



Whether you need a grouter, water truck or rig tender...



they will build the equipment to meet your needs.



Today, this small family-owned business manufactures an average of about 24 water tanks a year for customers throughout the United States. "Our customer base is more than 1000, many of which are long-time customers and most of these are within the U.S., although we do work for some drill rig manufacturers overseas," Brad stated. Water tanks aren't the only product manufactured at Rose-Wall. "We make grout machines and well drilling crank trucks, commonly referred to as mechanic's trucks," he added.

Ted is semi-retired, although he still spends a great deal of time at the facility, as well as enjoying one of his favorite hobbies, motorcycling. Brad admits things have not changed much since the old days when he was a kid, except he has boys of his own who are 10 and 12 years old. He hopes the boys will take over the business one day. Today, Brad is in charge of the overall operations of the business, which employs eight people. The company "...takes pride in being a hands-on, collaborative manufacturer which considers all of our customers personal friends and partners in the process. We genuinely care about their success and how our products make that success a reality. Thankfully, we have acquired a lot of friends and partners throughout the years!" Brad stated. He went on to tell a little about his own history with the company, "Since I was 10 years old I have worked with my dad at Rose-Wall. In 1989, at the ripe old age of 14, I was doing the final assembly on the grout machines. One day, we hired a new employee, who still works with us today; he was only 19. Dad told him, 'Brad will show you how to make hydraulic hoses and put the grout machines together.' Todd and I still joke about that to this day of how he thought to himself, 'This kid is going to show me what to do?' In those days, I would work after school, weekends, and anytime school was out. It was a fun time for me since I got to go to the conventions and ride in the water trucks. Even though I also had to clean the water trucks, it was still fun. Oh yes, the paycheck was nice too!"

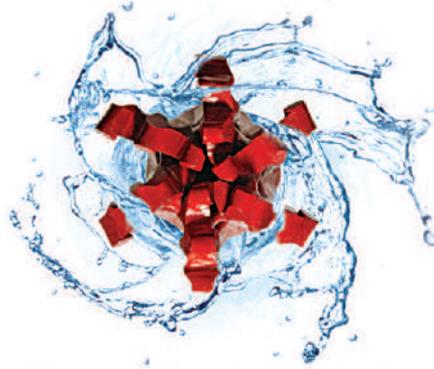
The *WWD* Team thoroughly enjoyed the experience of visiting our customer and this company which is such a positive influence on the industry and its people.

Our Sincere
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More Living with Wisdom

by *Tim Connor*

Here are three more tips to live a better life with faith, courage, integrity, peace, purpose, and success.

Manage expectations. One of the biggest causes of frustration and disappointment in life is the unrealized expectations of other people's behavior or life in general. Why won't my: kids, spouse, employees, friends, and so on act the way I think they should? They never will, so relax and let it go. You can never have peace while attached to the expectation or outcomes you have for other people or situations, no matter who or what they are. The execution of all behavior by others is in their hands, not yours. I am not implying you should never have expectations. I am only saying if you want to spend a lot of time and energy being disappointed, expect others to do whatever!! Sooner or later everyone - yes, everyone in life - will disappoint you. This includes friends, parents, spouses, kids, bosses, customers, and even faithful old Aunt Sally.

Live in the present. Life is lived in the present, one moment at a time - not in the past or future. Our futures and memories are created in all of our NOW moments. Living in the present means staying focused on what is happening now, not what happened yesterday, or may happen tomorrow. People who focus on past mistakes, errors in judgment, words said with innocence, omissions, and disappointment tend to bring a great deal of negative energy into the present. People who focus on the future: expectations, desires, hopes, and "some day dreams" tend to miss the value, joy, and wonder of their present moments. The key is to understand you can't fix what happened yesterday, and you can't fix anything tomorrow. You fix and change everything NOW.

Accept differences. We are all unique in our outlook, perceptions, attitudes, feelings, experiences, and history. There is no one just like us in the world. There never has been an exact duplicate of us, nor will there ever be. Differences make life interesting, and yes, challenging. Dealing with other people who see life differently than we do makes for interesting relationships. Differences give life its opportunities for growth, insight, and awareness. The unfortunate thing is these differences can often lead to unmanaged or unresolved conflict, stress, and disappointment.

In His service,

Tim

To receive Tim's weekly FREE motivational booster articles, contact him at www.timconnor.com with "please add me to your free booster e-mail subscriber list" in the subject line.
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In Memoriam

Ronald F. Irish, Jr. (1966~2015)

The Maine Ground Water Association sadly reported the passing of Ronald F. "Ron" Irish, Jr. on December 9, 2015, at Central Maine Medical Center in Lewiston with his family and friends at his bedside.

Ron was born September 28, 1966, in Peterborough, New Hampshire. He attended schools in Rindge and Jaffrey. He worked in the family business, Irish Well Drilling, Inc. for the past 28 years drilling wells and installing pumps in Eastern New Hampshire and Western Maine.

He enjoyed hunting and especially fishing with his daughter Sarah, and riding his Harley motorcycle with his many friends.

Ron is survived by his beloved daughter Sarah, stepsons David and Michael, mother Linda, father Ronald, grandmother Ernestina, several sisters, nieces, nephews, and other extended family.

The management and staff of *WorldWide Drilling Resource*[®] extend their sympathies to Ron's family, friends, and colleagues.



Ed Malzahn (1921~2015)



The Ditch Witch family was deeply saddened to announce the passing of the company's founder and industry icon Ed Malzahn on December 11, 2015, in Perry, Oklahoma.

He changed the way the world's utility infrastructure is installed and maintained when he launched the first service line trencher, the Ditch Witch model DWP, from a small machine shop in Oklahoma, in 1949. Now known as The Charles Machine Works, Inc., the company remains a leader in the industry it essentially created.

Recognition of Mr. Malzahn's accomplishments as an industry leader and innovator included his induction into the Oklahoma Inventors Hall of Fame, American Rental Association Hall of Fame, Construction Equipment Hall of Fame, and North American Society for Trenchless Technology Hall of Fame. He was also named inventor of the year by the Oklahoma Bar Association: Patent, Trademark, and Copyright Section.

Mr. Malzahn is survived by his three children, nine grandchildren, and 13 great-grandchildren.

The management and staff of *WorldWide Drilling Resource*[®] sends their condolences to the entire Ditch Witch family.

Earl Sexton (1926~2015)

Earl Sexton of Joelton, Tennessee, passed away Wednesday, December 30, 2015, at his home. He was born September 22, 1926, in Scott County, Tennessee to the late Will and Mindy Sexton. In addition to being a retired exploration drilling contractor, he also owned S.E. Sexton Drilling Company and was a member of New Hope Free Will Baptist Church.

He was preceded in death by his brother J.L.; grandmother Olivia Griffith and Aunt Arlenie Sexton, the two ladies who raised him.

He is survived by his wife of 53 years Betty; sons Jim (Barbara) and Eddie (Stephanie); daughter Melody; five grandchildren; one great-grandson; sister Jerry; niece Peggy (Phillip); nephew Bill (Pam); as well as several other loving great-nieces and great-nephews.

The management and staff of *WWD* wish to convey their deepest sympathies to Earl's family and friends.



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Exploring Geothermal Opportunities in British Columbia

Adapted from a News Release by Geoscience BC

Geoscience BC, a nonprofit organization in British Columbia (BC), Canada, is launching a project to identify and evaluate direct-use geothermal energy opportunities for BC communities.

"This project is the first step toward giving BC communities and businesses an understanding of what geothermal resources are available and how they may use them," said Dr. Catherine Hickson, principal of Tuya Terra Geo Corp and leader of the project.

Although BC has significant potential for geothermal resources, there is no electricity produced with geothermal power. In fact, direct-use geothermal energy is only used for therapeutic purposes at hot springs.

"Direct-use geothermal energy is used in other parts of the world for space heating, agricultural, industrial, commercial, snow clearing, and recreational purposes," explained geothermal geologist and direct-use expert, Gerald W. Huttner, president of Geothermal Management Company, Inc. and science coleader for the project.

Previous studies of direct-use geothermal energy in BC have focused on the end use application or have been specific to locations or projects. Communities and local governments may not have access to the expert knowledge required to oversee a geothermal exploration program, or the cost of exploration may be a major barrier to wider adoption of direct-use geothermal energy.

To help meet these needs, the project will compile existing, publicly-available geoscience data and survey communities to identify their needs, development choices, and economic development goals.

The result will be a *Geothermal Direct-Use Road Map* designed for communities, containing guidelines for surface exploration, land acquisition and permitting, drilling, and testing wells, leading to design and construction of facilities to benefit all.

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Drilling Into Money Not Boring

by Mark E. Battersby

Discount Profits

Everyone is, or should be aware of "discounts." Few within the drilling industry, however, have given much thought to either how much can be saved by taking advantage of discounts offered by suppliers or the cost of offering discounts.

Prompt payments from customers can mean improved cash flow for any drilling operation, less need for borrowed working capital, and far fewer collection problems.

Today, when cash discounts are offered by anyone selling services, supplies, or equipment, it is with the expectation the customer will pay within the discount period. In effect, the seller is offering to make the sale for the invoice price reduced by the amount of the discount.

The supplier's invoice usually includes credit terms listing the period of time for which credit is extended, the size of the discount offered to those paying cash, and the date the credit period begins. A cash discount is a reduction in the purchase price for those paying within a specific period.

A typical supplier's credit terms may be stated as "2/10 net 30." A buyer reads the terms as "a 2% discount if the invoice is paid within 10 days. Otherwise, the balance is due in 30 days. Why should anyone pay quickly to take advantage of a mere 2% discount?"

Assume a business has been extended credit terms of 2/10 net 30 on a \$1000 janitorial supplies purchase. By deciding to take the discount, the company will pay \$980 (\$1000 less 2%). By ignoring the discount, the full cost of \$1000 will be paid within the month.

The decision to not take the discount means the buyer is paying \$20 to keep the money for an extra 20 days. Because there are slightly more than 18, 20-day periods in a year, the interest cost on an annual basis amounts to more than 36%. Obviously, this level of potential savings makes it a smart move to take the discount, even if money must be borrowed to do so.

Since the principal disadvantage of offering discounts is the impact on the drilling operation's profits, the cost of discounts must be weighed against the improved cash flow which can result. Obviously, the credit terms of a drilling business should be designed to improve cash flow, the movement of money in and out of the drilling business.

Mark

Mark E. Battersby may be contacted via e-mail to michele@worldwidedrillingresource.com

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**Ronnie's
Real
World**

by **Veronica I.
"Ronnie"
Jones**



Ronnie and Mary Ann Pelletier
December 2015.

Friends and associates have helped us all through trying times, but what is most important to most of us is FAMILY. We here at **WWD** consider the drilling industry part of our family and that means YOU are IMPORTANT to us. Whatever your question is - just call the one and only RESOURCE -

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During my busy schedule, I read many articles in all sorts of publications and gain knowledge from others. Since I also manage this company, I look for

employee help - hiring, maintaining top quality employees, and making them happy too. I read this "STOP, LOOK, LISTEN..." in the December 15, 2015 issue of *Supervisors Legal Update* and want to share it with you. "Identifying employees who aren't rising stars. One great way to keep employees happy, motivated, and less prone to file lawsuits: Identify and advance your rising stars. But what traits are red flags indicating someone who isn't ready to move up?"

Workplace psychologists say there are 10 major signals that employees aren't star material. Those employees:

1. **Shun learning and training** because they just aren't drawn to picking up new things or think they know everything already.
2. **Aren't excited about their work** - though they may be quite competent at some level.
3. **Avoid unpleasant situations and people.** It's easier to go around unpleasantness, so they never learn to deal with it.
4. **Avoid risk** - all risk - for fear of making a mistake or being criticized. Those types usually don't understand that mistakes are part of progress.
5. **Never change their minds**, even in the face of the strongest facts indicating a change is needed.
6. **Refuse to admit they're wrong** - but of course often believe everyone else is.
7. **Can't let it go and move on** when things go wrong - and as you know, they invariably do go wrong once in a while.
8. **Don't have a clear picture of their strengths and weaknesses.** They tend to overestimate one and underestimate the other.
9. **Prefer to work alone**, often forgetting that work, first and foremost, is about dealing with people; the higher up you go, the more people skills come into play.

10. **Prefer to stay in the background when working in groups.** Leadership begins before someone is actually in the position of leadership.

Note: Some people may exhibit one or a few of these. When you can help them improve, many will show they have the potential to move up.

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AEM Announces Award Winners

Adapted from a Press Release by the Association of Equipment Manufacturers

The Association of Equipment Manufacturers (AEM) announced the 2015 recipients of its grassroots advocacy awards for companies with the highest level of activity in its I Make America campaign. A new Legacy Award joins the campaign's Pillar of the Industry recognition program. The new AEM I Make America Legacy award salutes companies which have been active in I Make America and earned continuous Gold status since the campaign was initiated five years ago.



"It's more important than ever that our elected officials understand the critical importance of our industry to economic prosperity and quality of life across America, and these companies have really stepped up in their communities," said Dennis Slater AEM president.

The inaugural Legacy Award winners are:

- Caterpillar, Inc.
- International Construction Equipment Inc.

The 2015 Pillar of the Industry Award Winners are:

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Through the Back Door!

by Jim Kuebelbeck

Dry Holes

My wife Carol often tells me I lose more sleep at night than the landowners for whom we work. I'll probably never get over it, but it is more than a little daunting when I am asked to locate a satisfactory water supply on a piece of property where only dry holes have been drilled previously. Sometimes, by the time we are called to assist, thousands of dollars have already been spent in unsuccessful attempts to locate a good water source. Selecting a new drilling site and then telling distressed landowners where to spend more of their hard-earned money in a search for a good groundwater source is more than scary at times. In our water-locating work it seems we often learn more about "human" nature than anything else.

A few months ago, a well drilling professional called and asked how soon we could get out to a five-acre piece of property located about 25 miles from our home. He had just drilled two dry holes on the property, and was in the process of taking out the drill rods from the second dry hole. "I'll have to tell you," he said, "After the first dry hole I told the landowner that it might be a good idea to hire you, but he said he had looked on the Internet and read a lot of negative things about water dowers, so I should just drill again some distance away from the dry hole. I told him that you had often helped us out when we were having trouble finding water, and not to believe everything he reads on the Internet. Now after the second dry hole, he told me to call you. He built a big storage shed on the property about a year ago and now wants to build a house out here."

I told him we could get out to the property in an hour or so, and he said he'd probably still be at the site. It was mid-afternoon when we arrived, and the property owner and the drilling contractor appeared to be in the midst of some animated conversation. After we introduced ourselves to the landowner we learned that the adjacent property owner (who was no longer on-site) had just walked over and asked how things were going. When he was told that two dry holes had just been drilled on the property, he said, "Well, I could have told you that! Someone wanted to build on this property a few years ago, and drilled seven dry holes before giving up!"

Up until a few minutes ago, this bit of information was obviously unknown to both of them, and now all attention was suddenly directed toward where Carol and I were standing. Trying to break the following uncomfortable silence, I looked at the well drilling contractor and said, "And now after hearing this, just what do you want 'us' to do here?"

First looking at the landowner and then to me, he said, "Just do your magic like you always do."

I could almost hear my late father's words of wisdom ringing in my ears telling me: *Jim, sometimes a good run is better than a bad stand!*

Opportunity is missed by most people because it is dressed in overalls and looks like work.
~Thomas A. Edison

There wasn't much conversation between Carol and me as we began to dowe the property. We finally did discover one promising "possibility" and marked the location. I asked the contractor if he was going to start drilling again later that afternoon, and he said he'd probably only get set up, and begin drilling in the morning. Arriving home about two hours later, he called and said, "Jim, things are looking good. I got all set up and thought I'd drill a bit today after all. I'm already running into some nice sand and it looks like there's a bunch of water in it. I'll let you know what happens."

Less than an hour later I noticed a missed call message on my cell phone. There were no recorded words, however. There was only a great close-up color photo showing the most beautiful good clean water gushing out of the well!

Jim

Jim Kuebelbeck may be contacted via e-mail to michele@worldwidedrillingresource.com

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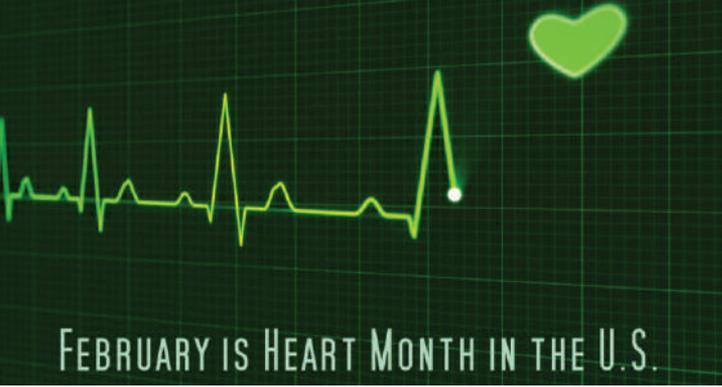
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Is Your Heart Older than You?

*Adapted from Information Provided by
the Centers for Disease Control and Prevention*

Your heart may be older than you are - and that's not good. According to a Vital Signs report by the Centers for Disease Control and Prevention (CDC), 3 out of 4 U.S. adults have a predicted heart age older than their actual age which causes higher risk for heart attacks and stroke.

"Heart age" is the calculated age of a person's cardiovascular system based on his or her risk factor profile. Risks include high blood pressure, cigarette smoking, diabetes status, and body mass index as an indicator for obesity.

This is the first study to provide population-level estimates of heart age and to highlight disparities in heart age nationwide. The report reveals heart age varies by race/ethnicity, gender, region, and other sociodemographic characteristics.

CDC researchers used risk factor data collected from every U.S. state, along with information from the Framingham Heart Study to determine nearly 69 million adults between the ages of 30 and 74 have a heart age older than their actual age. That's about the number of people living in the 130 largest U.S. cities combined.

"Too many U.S. adults have a heart age years older than their real age, increasing their risk of heart disease and stroke," said CDC Director Tom Frieden, M.D., M.P.H. "Everybody deserves to be young - or at least not old - at heart."

Key findings in the report include:

- ♥ Overall, the average heart age for adult men is 8 years older than their chronological age, compared to 5 years older for women.
- ♥ Although heart age exceeds chronological age for all race/ethnic groups, it is highest among African-American men and women (average of 11 years older for both).
- ♥ Among both U.S. men and women, excess heart age increases with age and decreases with greater education and household income.
- ♥ There are geographic differences in average heart age across states. Adults in the Southern U.S. typically have higher heart ages. For example, Mississippi, West Virginia, Kentucky, Louisiana, and Alabama have the highest percentage of adults with a heart age 5 years or more over their actual age, while Utah, Colorado, California, Hawaii, and Massachusetts have the lowest percentage.

The heart age concept was created to more effectively communicate a person's risk of dying from heart attack or stroke and to show what can be done to lower the risk. Despite the serious national problem of higher heart age, the report's findings can be used on both an individual and population level to boost heart health, particularly among groups most at risk of poor cardiovascular outcomes.

Healthcare providers can use cardiovascular risk assessment calculators to inform treatment decisions and work with patients on healthy

habits. For example, a 53-year-old woman might find out through her doctor that her heart age is 68 because she smokes and has uncontrolled high blood pressure. Her doctor could then talk with her about finding a quit-smoking program right for her, and about lifestyle changes and medications which would put her in charge of her blood pressure.

"Because so many U.S. adults don't understand their cardiovascular disease risk, they are missing out on early opportunities to prevent future heart attacks or strokes," said Barbara A. Bowman, Ph.D., director of CDC's Division for Heart Disease and Stroke Prevention. "About 3 in 4 heart attacks and strokes are due to risk factors that increase heart age, so it's important to continue focusing on efforts to improve heart health and increase access to early and affordable detection and treatment resources nationwide."

What you can do:

- ♥ Learn your heart age and how to improve it at www.cdc.gov/heartdisease/heartage.htm.
- ♥ Start by choosing a risk factor you're ready to change, such as smoking or high blood pressure, and focus on improving it first.
- ♥ Work with your doctor to make healthy choices for a lower heart age.
- ♥ Take action at any age to lower your heart age and keep it lower over time.

For more information, visit www.cdc.gov/heartdisease and www.cdc.gov/stroke. Visit www.millionhearts.hhs.gov to learn about Million Hearts, a national initiative to prevent 1 million heart attacks and strokes by 2017.

Examples of actual age vs. heart age

Many people have a heart age that is greater than their actual age because of certain reasons.

Actual Age	Reasons	Heart Age
45 year old male	<ul style="list-style-type: none"> • Smoker • High blood pressure (systolic blood pressure of 150 mm Hg) • Diabetic • Healthy weight (body mass index (BMI) of 23) 	75 years
50 year old female	<ul style="list-style-type: none"> • Non-Smoker • High blood pressure (systolic blood pressure of 148 mm Hg) • Diabetic • Obese (BMI of 32) 	85 years

The World's First and Only Dive Rig

*Adapted from Information by
Seaventures Dive Rig*

A jack-up accommodation module previously used in service to the oil and gas industry is getting a second chance at adventure as a destination for divers from around the world.

Seaventures Dive Rig has a history of intrigue, creativity, and inspiration. Constructed in Panama, it was towed across the ocean for use in several different locations until being decommissioned in 1985, and left in a Singapore shipyard to await another journey.

The rig's next journey began when a previous Chief Minister stumbled upon the great metal structure with vision and foresight to see its wonderful potential. He imagined a new life for the rig as a hotel that could be situated right in the heart of the sea.

The old rig was a new opportunity to embrace ecotourism. It could become a hotel without upsetting the marine ecosystem.

Originally, the rig was geared toward fishing since visitors could easily take advantage of marine life thriving in the shelter of the rig's six legs. With this in mind, the rig was refurbished, but then plans changed.

A decision was made to relocate the rig to Mabul Island, Malaysia, in a world-renowned, top-dive destination with the sole intention of providing a base to divers. Since 1997, the Seaventure Dive Rig has been at its current location.

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A trademark feature of the rig is its famed elevator which lowers visitors directly into a house reef where the rig's structures have created a haven for fish, as well as divers who come from far and wide to enjoy them.



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Designing a Drill for Use in Space

Adapted from a Press Release by Honeybee Robotics

Honeybee Robotics is beginning a new phase of development of its Planetary Deep Drill, a lightweight and portable drill designed to reach below the surface of icy formations in the Martian polar caps, Saturn's moon, Enceladus, or Jupiter's moon, Europa. After validating the drill's performance in laboratory tests, the company is now conducting field trials at a gypsum quarry, where rock formations provide conditions similar to drilling through future planetary targets.

At USG Corporation's gypsum quarry near the Salton Sea in California, Honeybee will select a formation of rock with strength similar to cryogenic ice. Engineers are targeting drilling to a depth of 100 feet, which will test the major functions of the drill and provide data for future improvements, including embedding additional sensors for "sensing-while-drilling" and in-situ experiments.

"Over the last two decades, Honeybee has developed dozens of approaches to planetary drilling and sampling. The Planetary Deep Drill is especially exciting because it provides access to samples that are otherwise inaccessible to instruments that can characterize geologic formations and detect trace levels of organic materials," said Kris Zacny, director of the Exploration Technology Group for Honeybee Robotics.

Developed with the support of the Planetary Society and the American Museum of Natural History, the Planetary Deep Drill is designed to gather samples for surface analysis. During the USG field trials, the drill will be equipped with humidity and temperature sensors, as well as a microscope capable of imaging particles as small as 0.5 microns in both white and ultraviolet light. Future versions of the drill may include instruments selected for the Mars2020 mission to test their performance in Mars-analog conditions.

Compared to the capabilities of the Planetary Deep Drill, the tools which have already been deployed to the Moon and Mars offer relatively shallow access. The Planetary Deep Drill System is a wireline drill, with its depth limited by the length of a tether suspending it rather than the length of an individual drill bit. It contains all of the motors, electronics, and sensors required for operation and uses highly efficient rotary percussive drilling technology, which helps conserve valuable energy. In fact, it operates on as little as 250 watts of power - less than many consumer-grade battery-powered drills. The configuration of the drill makes it possible to deploy from either a rover or lander before beginning autonomous operations.

"This prototype drill is exciting and highly innovative, not only because of the depths it can reach, but because it will carry a scientific payload that will deliver large amounts of data to the surface. A microscope with two LEDs will provide images with resolution high enough to image bacteria, and large enough to see fossils and/or geologic features easily visible to the naked eye. In addition, humidity and temperature sensors will be onboard the drill. These instruments are meant to demonstrate that rugged data-gathering instrumentation can be placed on board a drill that can penetrate deep enough to reach water, and perhaps life, on Mars," said Michael Shara, science principal investigator of the Planetary Deep Drill, curator of astrophysics at the American Museum of Natural History, and adjunct professor of astronomy at Columbia University.



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Extra Benefits of Geothermal

by Peter Tavino
Litchfield Geothermal

When our local electric company held a seminar entitled: "Selling Energy" with Mark Jewell, I was impressed at how many times there were fringe benefits associated with

an energy upgrade improvement project. Many of Mark's clients who switched to LED light bulbs later reported they also saw increased production by workers because of the brighter work spaces.

While inspecting the drilling of a borehole for a geothermal retrofit project in Connecticut in December, I thought I heard a strange noise when the drill rig wasn't making its own. Sure enough, one of the two-ton air source air conditioner condensers near the five-ton condenser we were replacing was running! It stopped soon after, but the next day I video recorded the other two-ton unit running too. The widowed owner did not realize this problem was ongoing for years, though I suspected something was afoot when she had shown me her \$500 per month electric bill and high propane bills a few weeks earlier.

After I shut off power to the three disobedient condensers (and thermostats) at the panel box, our competent heating contractor reported there was a backfeed in the low-voltage wiring (it was never done correctly), requiring him to add some isolation relays and do a little rewiring. Had she not decided on the geothermal project, her wasteful situation of heating and cooling at the same time would have persisted.

Other benefits likely to occur during a geothermal system install include locating unknown footing and gutter drains, extent of buried oil tank if near a trench cut, etc. The drilling tells the landowner how deep ledge is, if it were unknown, and what water yield is at the borehole depths.

When coring through a basement wall connecting to a borehole, sometimes other openings letting semiconditioned air escape are discovered and sealed. These can usually be where the line set enters the house. The floor plan studied for heat loss calculations for a recent job on file with the town was incorrect, and the owner had an opportunity to address tax appraisal cost.

Lastly, once the geothermal system is in place, and the winter humidity of the inside air is higher because coil temperatures are lower than from combustion, the owner experiences nasal comfort like never before, and feels the real extra benefit.

*The statements and comments in this article are based on information and references believed to be true and factual. If you have any questions or comments, please forward them to me in care of **WWR**.*

Pete

Peter Tavino may be contacted via e-mail to michele@worldwidedrillingresource.com

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Hitting the Salty Spot

Compiled by Amy White

Associate Editor *WorldWide Drilling Resource*®

Family feasts always need a touch of something special. Perhaps a sprinkle of 600-million-year-old salt from West Virginia will do.

J.Q. Dickinson Salt-Works lies in West Virginia's Kanawha River Valley, in the small town of Malden, a little southeast of the capital city of Charleston. It is a small operation run by sister and brother Nancy Bruns and Lewis Payne.



Siblings Nancy Bruns and Lewis Payne harvest salt on the same land their ancestors did 200 years ago, but from new brine wells. Photos courtesy of Lauren Stonestreet, www.elleeffect.com

Salt is not the first natural resource most people think of when West Virginia is called to mind; but once upon a time, salt was a prime commodity in the state. Where does the salt come from? An ancient sea below the Appalachian Mountains, the Iapetus, though mostly dry, still feeds underground springs in the area.

The original J.Q. Dickinson began in 1817, and provided a basic necessity in prerefrigeration America. Pioneers needed salt and meat-packers did too. The only choice was to drill deep. Using hollowed-out tree trunks for piping, William Dickinson drilled for brine to become one of the first major salt producers in a town that became

known as "the salt capital of the east."

Though as many as 50 different salt manufacturers once tapped the same brine, J.Q. Dickinson was the only salt company in West Virginia to survive into the 20th century. Even so, the business eventually came to a halt due to several factors, including increased salt production from mines in Utah and Michigan.

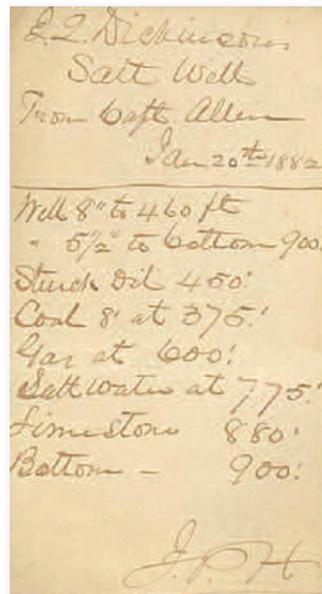
Then, several years ago, Bruns and her husband Carter who is a historian, researched the valley's geological history and learned the ancient salt was still accessible, even though wells on the J.Q. Dickinson property were not in working order. Bruns and her brother found a map from the early 1900s; fortunately, they were able to follow it directly to the salty source.

Today, J.Q. Dickinson once again bears the same name, and is run in the same location where the siblings' ancestors started it two centuries ago. The production process is simple: Pumps draw brine from the well into a holding tank. From there, the brine is poured into long, wooden beds inside a hoop house. Once the water evaporates, the residual 600 pounds of salt is pumped into a sun house where it crystallizes. The entire process takes five weeks.

J.Q. Dickinson salt is now used as a finishing touch, rather than a preservative. A dash is said to give fine food an over-the-top flavor. The key to getting just the right saltiness, according to Bruns, was to keep drilling deeper until they hit the right spot. Bruns told NPR, "We went through a lot of freshwater on the way down. And we all had cups; we were tasting it on the way down, and I just said no, keep drilling; it's not salty yet."

Brun said when they finally hit the right spot, everyone could relax. After a single, salty sip, the siblings knew their dream of reviving the family business could work.

Much of the history of West Virginia's economic development can be traced through the Dickinson family, back to salt 300 feet below the surface. With the work of Bruns and Payne, this pioneer industry continues to be a savory presence, adding flavor to the state's history and the world's culinary delights.



Above: A handwritten note from the J.Q. Dickinson Company in 1882, and a salt well in operation by the company on the Kanawha River bank in 1910.



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Editor's Note: In between our print issues, the WWD&R Team prepares an electronic newsletter called E-News Flash. Based on readership, this was the most popular E-News Flash article of the month. Get in on the action and subscribe today at: www.worldwidedrillingresource.com



Safety Spotlight: Utility Location

by Scott Cosby



The topic of this month's article is utility location. Drilling requires going subsurface, belowground level for geotechnical, environmental, and water well activities. In the past, most utility lines were strung aboveground. During the present day, public utilities (e.g. electric, gas, telecommunications, and others) have been placed belowground level at varying depths. It is important to handle these lines with care. A slight puncture or major cut to any of these lines can cause disruption to the public and dangers to a drilling crew. We'll examine the possible dangers, the utility locator in my state of residence, and the information required for utility location before drilling operations begins.

Though electrical lines may look harmless, high-voltage lines used to conduct electricity from one place to another can be hazardous or even deadly if a person accidentally comes into contact with one. Gas lines have the potential for a massive explosion. Telecommunication line failures can affect public information and notification. The size of the line cut will often determine the damage to result.

OKIE811 is Oklahoma's One-Call System managing all incoming utility locate requests. They have many customer support representatives who take statewide locate requests 24 hours a day, 7 days a week. When making a utility locate request, the following information is required:

- Excavator name/company name and phone number
- Contact name, telephone, and cell phone number
- Work site street and number (include north, south, east, west)
- Nearest intersection or highway
- Township, range, section, and quarter section
- White line area of excavation
- Approximate location (street, private property, front, rear, side, etc.)
- Mailing address
- A work start date and time of excavation
- County and nearest town or city
- GPS - latitude/longitude
- Type and extent of the proposed work
- Type of equipment to be used
- Work being done for

Consult search engines for more information on this topic. Contact your local utility locator for more information as well; some companies offer valuable resources and training. Be sure to provide in-house training on this subject to all drill operators and crews to keep them and the public safe, and infrastructure intact.

Scott

Scott Cosby may be contacted via e-mail to michele@worldwidedrillingresource.com

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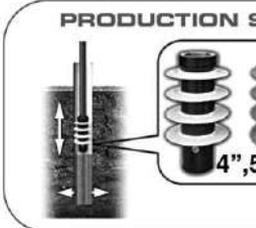


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Environmental Monitoring

by Thomas Kwader, Ph.D., P.G.



How Not to Develop a Well

A few weeks ago, I received a call from a drilling contractor about a problem he was having developing a relatively shallow screened well, about 50 feet deep. He said he had drilled many wells in the area and felt there should be plenty of water in this formation, but the well was being "stubborn". The water level was about 5 feet above the top of the 10-foot screen or about 35 feet below land surface. I asked if the well had been drilled with a gel-based drilling mud and was told it was not, so it was likely not a gel cake type of problem.

After a few minutes of conversation, I could tell he was relatively new to drilling wells and was told to "get the mud out" of the screen by flushing 500 gallons of fresh-water quickly into the top of the well. Apparently, the idea is to "push" the mud out away from the screen and into the sand and gravel away from the wellbore.

I thought about it for a few minutes and concluded this could work, but it was a risky thing to do. If the formation was very permeable, the mud cake could be pushed far enough away from the screen and conceivably work, but the well would soon turn "muddy" when the pump started pulling water back to the screen. I then recommended a surge block to break up the plugging and pull the drill mud back into the well, gradually. I would never recommend this method of development because of plugging the formation and taking a chance of not being able to retrieve the mud.

Occasionally, you may need to "add water" to a new well to break the mud cake down, but not large amounts of water; only enough to promote a surging action, back and forth. However, you should pump or bail out more water than you put in the well to maintain a flow to the well - not away from it.

Tom

Tom Kwader may be contacted via e-mail to michele@worldwidedrillingresource.com

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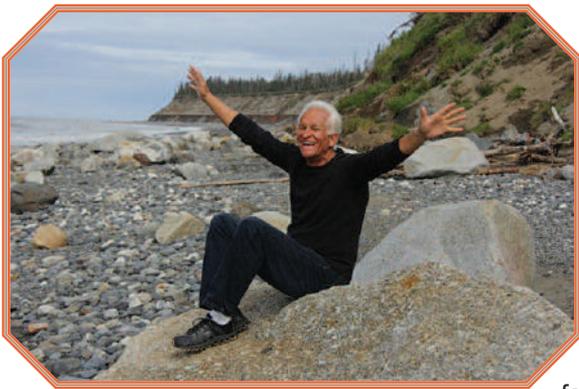
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Tips for Baby Boomers Still on the Job

Adapted from Information by News and Experts

Baby Boomers may recall one of the poets they grew up reading, Dylan Thomas, and his most famous poem, named for its first line, "Do not go gentle into that good night," a desperate appeal to resist the trappings of old age.

"As they retire, baby boomers need to stay true to their reputation for grand statements, and to mobilize their skill set in the business world,"

said media expert Steve Kayser, author of *The Greatest Words You've Never Heard*.

"In fact, many older Americans may have little choice but to adapt their mind-set and survive longer in their careers if they want to maintain something resembling their current lifestyle during retirement."

Kayser lists a few trends which may be incentives for aging workers to clock in for a few more years:

- The number of Americans 55 and older will almost double by 2030 - from 60 million to 107.6 million, according to the United States Census Bureau. This will likely strain public safety nets such as Social Security and Medicare.

- American life expectancy is at an all-time high, while death rates are at an all-time low, which means some people will outlive their retirement savings.

- The global economic crisis wiped out, or severely affected millions of middle- and senior-aged people's life savings.

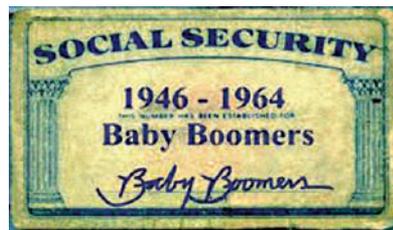
With an increasingly competitive pool of professionals whose skill sets need to be regularly updated, how can boomers stay in the game? The answer lies in learning, unlearning, and relearning.

The ever-shifting sands of technology pose a unique challenge to older workers. Younger professionals not only grew up working and entertaining themselves with screens, they also learned to adapt to technological leaps. A program you learn today may not be relevant in a few years, so keep an open and flexible mind.

Answer the question, "What strikes a chord with you?" This is a deceptively deep question when you apply it to your life's path. If life hasn't turned out as you expected it would 30 years ago, then it's time to readjust the way you see yourself, especially if that's as a perpetual preretiree. If you're not sure of how you see yourself in today's setting, start with what spiritual writer Joseph Campbell called the "moving power of your life," which can be sensed through things that resonate within you. Something that strikes a cord inside you, such as an unusual book, may just be the compass you need to find your way.

Finally, be RELEVANT - this acronym encompasses the ideas of promoting a proactive life:

- Risk
- Experiment
- Listen and learn
- Engage
- Value
- Attitude of gratitude
- No to negativity
- Time



"This is an ongoing, evolving note to keep in your mind no matter your professional situation," Kayser said. "I've been around a lot of charismatic and effervescent folks in their 70s and 80s who are still successful and growing, both on a personal and business level."



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Pictured at the presentation of the 4 millionth Flygt pump event in Emmaboda, Sweden, is Xylem President of Transport Tomas Brannemo.

Xylem Celebrates a Milestone

Adapted from a Press Release by Xylem, Inc.

Xylem Inc., a global water technology company, announced the production of their 4 millionth Flygt wastewater pump at its state-of-the-art manufacturing facility in Sweden. Xylem is the first international pump manufacturer to have produced this quantity of wastewater pumps at the same facility. This wastewater pump will support the operation of the central pumping station at Azaibah, Muscat, Oman, which pumps wastewater more than four miles to the Al Ansab treatment plant in the Middle Eastern state.

Xylem's Flygt brand has a 100-year legacy of innovation in pumping, from developing the first submerged pumps, to designing the nonclogging N-impeller, to producing wear-resistant hydraulics. The very first Flygt pump was manufactured at Xylem's factory in Emmaboda, Sweden; they are now produced at manufacturing sites around the world in China, India, the United States, and Argentina. The company applies its expertise and

technologies to solve complex global water challenges including removing floodwaters from New York and New Jersey following Hurricane Sandy, providing energy efficient wastewater pumping at Heathrow airport, and preventing flooding of downtown Kuala Lumpur.

The 4 millionth 500-kilowatt pump stands over 9 feet tall and weighs nearly 12,000 pounds. It features Flygt's state-of-the-art monitoring system for operational safety and accessible data review. When the existing Flygt pumps in the central pumping station require routine maintenance, the new pump will ensure this critical pumping station can continue to operate efficiently.

Tomas Brannemo, Xylem senior vice president and president of transport said, "As the original submersible wastewater pump, the Flygt pump transformed the wastewater industry, and we have continued to innovate since that time. We are very proud of the brand's rich heritage and this 4 millionth Flygt wastewater pump will play a key role in supporting a sustainable environment in Oman. I also look forward to many future milestones and believe the expertise, innovation, and market-leading technology at Xylem will ensure customers always have the most advanced and efficient water pump solutions in the industry."



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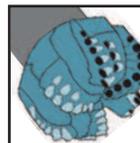
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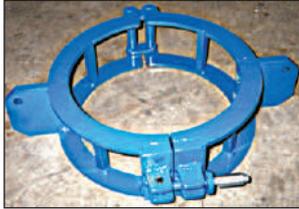
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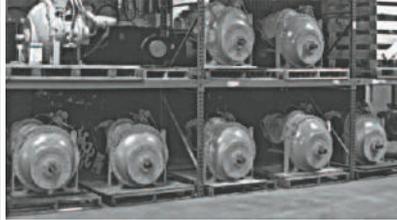
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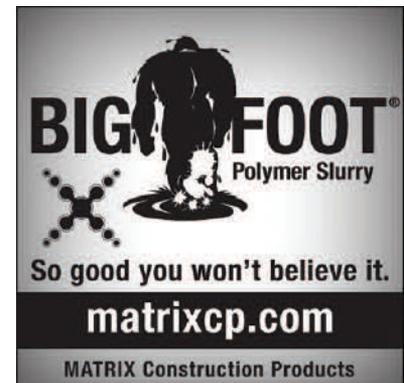
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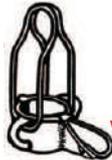
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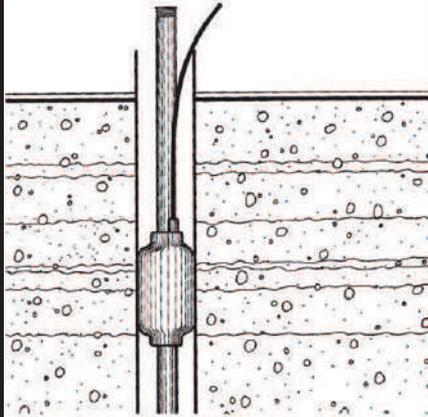
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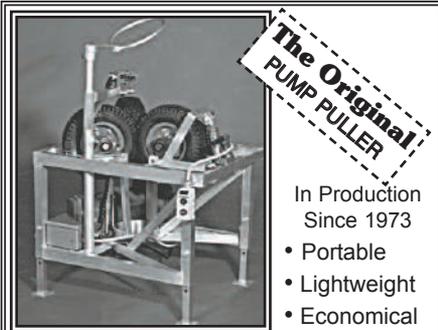
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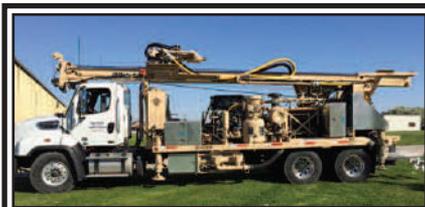
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WWR photo of Battle Mountain, Nevada, barite samples.

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- Most mined barite is used by the oil and gas industry as a weighting material in the formulation of drilling mud. These high-density muds are pumped down the drill stem, exit through the cutting bit, and return to the surface between the drill stem and the wall of the well. This does two things: it cools the drill bit and suspends rock cuttings, carrying them up to the surface. Barite increases the hydrostatic pressure of the drilling mud, allowing it to compensate for high-pressure zones experienced during drilling.

- Another use is in the medical field. If you've ever had an upper GI (gastrointestinal) test, the barium drink you ingest is actually a high-purity form of barite. The barite's density prevents x-ray penetration, making it visible on an x-ray. This makes the outline of the gastrointestinal tract visible, allowing doctors to identify potential issues.

- Some uses for barite you may not be familiar with include plastics, clutch pads, radiation shielding, television and computer monitors, sound-deadening materials in cars, traffic cones, brake linings, and golf balls. It is also used as a pigment in paints and as a filler for paper, cloth, and rubber. The paper used in some playing cards has barite packed between the paper fibers. This gives the paper a high density which allows the cards to be dealt easily.

- China and India are the leading producers of barite. They also have the largest reserves.

There is some debate about the spelling of Barite. For the last 100 years or so, it has been spelled Barite in the U.S.; however, in the United Kingdom, the spelling has been Baryte. No matter how you spell it, our world is better with barite.



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