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Volume 13 December 2016

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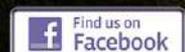


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WONDERFUL...

"It's the Most Wonderful Time of the Year!"

This is so very true, and I'm sure a great many of us remember this song and the movie it played in. Wanna take a guess? Win a gift from the **WWR** Team? Send your guess to:



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Yes, with the end of 2016 rapidly closing in on us, the holiday spirit has everyone running hither and yon. Why don't we just slow down for a few moments and remember all those wonderful years gone by. Maybe the entire family (who most certainly lived much closer than we all do now) went to each other's homes to sit by the fire, have some hot cocoa, popcorn, gaze at the tree, and remember about "those good old days".

Ironic isn't it - there have been many other "good old days" or as is now said by our son Wade Charles Jones (Chuck to me), "Back in the day..." That always makes me smile as I'm not sure what it means. But it sounds to me like fond memories he has of "those good old days".

No matter how you say it, how you spend the end of 2016, be it on the beaches with "melting" Christmas trees, or perhaps in the mountains sledding, snow skiing, or snowball fighting, with or without friends or family - just remember those "good old days" fondly. I trust that will make you smile and feel good all over. I know it will me.



There hasn't been a person in my life I can honestly say, I didn't learn something from, grow from their advice, and enjoy their company. From all of us here at **WorldWide** to each of you, may you have a

Very Merry Christmas and Happy, as well as Prosperous, New Year.

*A special thank-you to Delores Short for allowing us to continue running Harry's articles throughout this year. He was a very dear part of **WWR** and will be sorely missed.*

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Molecules

by Bill Corey
Pentair Water
Training Institute

Kind of strange that when you talk about pumps, you might talk about molecules. Yet

everything is made of molecules. Daniel Bernoulli was born in 1700, and even way back then he could tell water molecules were noncompressible. I'm not sure if he could distinguish between one water molecule and another, but he knew we could not put enough pressure to compress them. Why is this important? Because last month I talked about cooling a submersible motor and said you had to have a certain velocity of water moving past the motor to cool it.

So because water is noncompressible, we can use a very simple formula to convert speed into head, our word for energy. The formula is $V^2 \div 2G$ [V^2 is the velocity of the water squared; $2G$ is 2 times the Universal Gravitation Constant ($G=32.2$ feet per second)] and the answer is in Head Energy. Friction Energy is heat; and remember, water is a very good conductor of heat.

I've said in the past, motors create a lot of heat. The heat is transferred from the motor stator to the shell of the motor; and from that contact from the shell, to the water moving past it, the heat is then transferred to the water molecule. Now if the water molecule doesn't move fast enough, the water around the motor gets hot, again water is a good conductor of heat. One-horsepower submersible motors or less have a built-in thermal-overload protector. The overload is a thermal or heat-sensitive device. So when the water around the motor gets too hot, the overload trips. Yes, it is a normally closed switch which opens up when it gets too hot. This stops the flow of electricity and, because it is also automatic, you have to wait for it to cool off before it will close and the motor will start again.

Now if the water is moving fast enough past the motor, those molecules carry the heat away. What makes the water move fast enough? According to Mr. Bernoulli, it is the area the water is moving through. A meteorologist will tell you never to seek shelter from a tornado under a bridge. Why? Bernoulli said the smaller the area something is moving through, the faster it will move. When you have a tornado, the wind is already moving very fast; but when you force it through a smaller area it will move even faster. Same with water - the smaller the area it has to move through, the faster it will move. Please refer back to the last issue for the chart which told you what size the pipe would be to get the velocity fast enough to move the heat away.

Now remember, we can convert velocity to head, but we can also say flow and velocity. So I can convert the velocity required to remove the heat from the motor to flow, which is exactly what the chart tells you.

I hope this wasn't too confusing. I know one guy who had a very hard time trying to understand how we could convert velocity to flow, but of course it is all related to the area the water is moving through.

Have a good month. Let me know if you have any questions.

Bill

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

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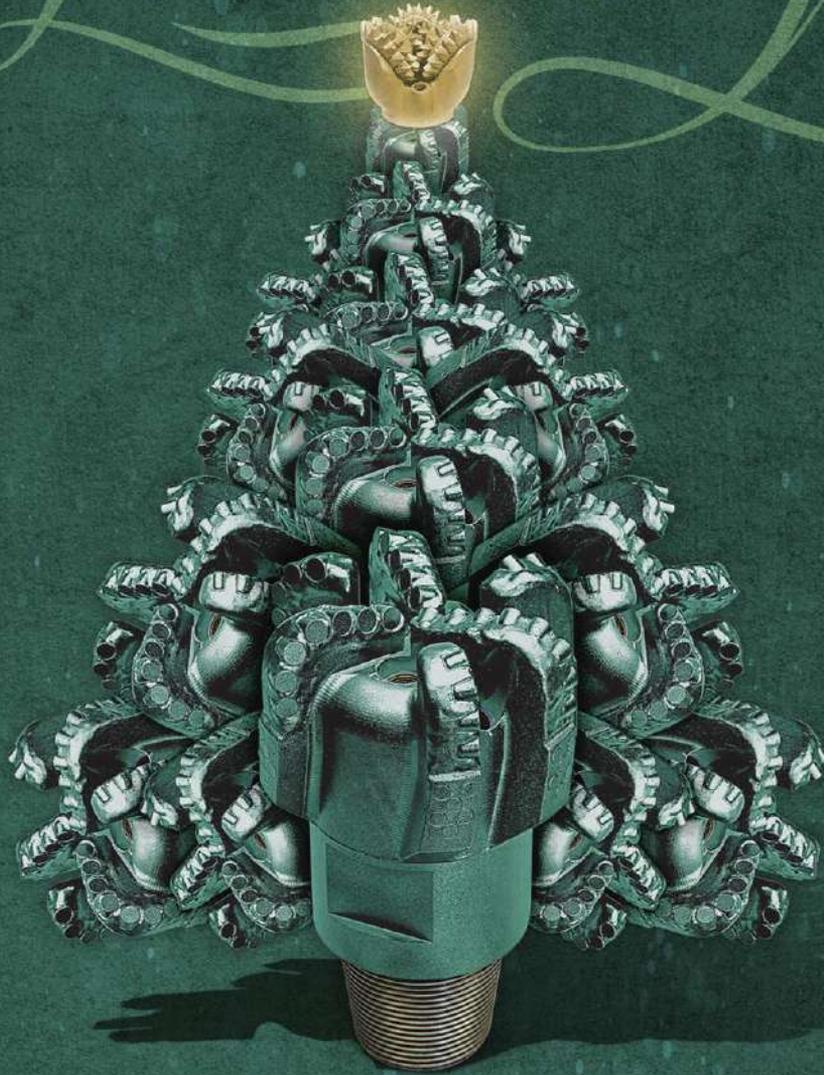
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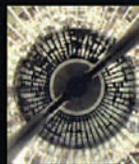
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End of the Year is a Time for Reflection

by **Tim Connor**

Let me start with two questions:

1. Five years from today, how would you like your life to be better or different?
2. What are you willing to do, start, or stop to achieve this mission?

The end of the year is an ideal time to reflect or take action on:

1. Progress made toward your goals.
2. The lack of progress made toward your goals.
3. The establishment of new goals.
4. The letting go of old goals which no longer interest or motivate you.
5. Who you are surrounding yourself with in your life and career.
6. What your major life and career highlights during the previous year were.
7. What you failed miserably at, and why or how.
8. How your philosophy of life has changed.
9. What your major lessons in life this year were.
10. How much time you are spending on self-improvement.
11. How much money you are investing on self-improvement books, CDs, classes, and/or seminars.
12. Mistakes in judgment which cost you time, energy, or money.
13. A relationship which may need some extra effort, time, or energy.
14. Who or what it is time to let go of in your life.
15. Projects or activities which need more/less time.
16. Some old habits it is time to change.
17. Some new habits you would like to begin.
18. If you could change only one thing in your life next year, what would it be?
19. If you could improve one area of your life next year, what would it be?
20. Decisions you need to make or reflection on the outcomes of previous decisions/choices.

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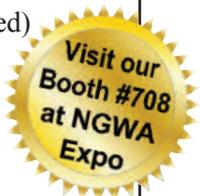
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I generally take the last two weeks of every year to contemplate these questions, as well as others too numerous to mention in this short article, but I am sure you have the idea. Spend some quiet time reflecting on some or all of these questions. You can also come up with some additional questions if you are inclined. Don't just settle for mine.

I hope you all have a happy and safe holiday season!

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. Or contact him via e-mail to michele@worldwidedrillingresource.com

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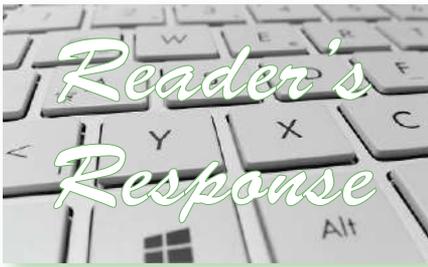
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RE: Thomas Kwader Article [Advantages of Private Wells Over City Municipal Well Systems, page 55, November 2016 *WWR*]

I, like Tom, am not real happy with municipalities/states/or federal agencies trimming back on our rights or freedoms. However, there is an important point or two I think Tom should consider for his discussion about private water supply wells in urban & suburban areas.

As Tom noted, many of these wells were not properly grouted, and as a result, allow for contamination of the local aquifer. This is very often true, and a real problem.

In the small town where I live, and many other towns and cities, in-home wells were actually installed in basements. These wells are often many years old

(1930s-1950s) and many current homeowners don't even know these wells exist. They are often covered with a box or can. These wells not only offer a pathway for contamination into the aquifer, but also a pathway for vapor intrusion into the home. So if there is/was an old gas station on the corner across the street (or a dry cleaner with PCE dry cleaning fluid) with the normal soil and groundwater contamination with gasoline, the vapors from the contamination plume can travel up the well annulus into a home. Under bad conditions gasoline vapors can lead to explosions due to buildup of the vapors in the basement. The home heating unit comes on or the hot water heater kicks on and . . . BOOM! . . . the vapors are ignited. This has happened.

Less dramatic, but still of real concern, is the lower concentration of gasoline or PCE vapors coming up these old wells. It can lead to exposure to carcinogens (benzene in gasoline or PCE from old dry cleaning fluid, etc.), sometimes at significant levels over many years. Again, vapors enter the basement, the heating or cooling unit kicks on, and air from the basement with benzene or PCE is now circulated through the home for the entire family to breath. Vapor Intrusion.

The other problem we have experienced locally (here in Salina, Kansas) is the inappropriate use of water during drought. The city has put out a water rationing requirement several times over the last years during a significant period of drought with requirements to water your lawn or garden only two days a week or you are subject to fines. However, the citizens with their little private lawn and garden wells continue to water their yards or gardens, saying they are not on the municipal water system so are not restricted. What they do not understand is the wells they are pumping draw water from the same aquifer which supplies everyone in the city. So, there are hundreds of people in the city with these small private wells happily pumping away to water their grass while continuing to deplete the aquifer which everyone in the city depends on. It took some time, but the city finally got this cleared up.

So, the local or state regulations about these private wells within the city limits or associated suburban areas is not all about "big government taking away your freedoms". Often, there are valid reasons these local ordinances or state regulations are put in place . . . to protect us from ourselves . . . many times.

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Tom Kwader reply:

Wes,

Thanks for taking time to respond on this important topic. I absolutely agree with your comments. Private well owners have certain rights, and they also have responsibilities to water resources that are shared by everyone, especially when they are withdrawing from an aquifer which is shared by the public at large. I have a few other thoughts I realize I have left out of the article.

1) All private water wells used for drinking sources should be tested every year or two for primary drinking water compounds of concern (CoCs). I know of at least a half dozen private wells which were tested, and several compounds of concern above MCLs were found at dangerous levels.

2) All drinking water wells should have the casings grouted to the top of the producing zone. This would prevent contamination from entering the well from surface sources, and also prevent vapors from accumulating in lower living spaces of the house where the well is located. I know of one case where methane vapors accumulated and the pressure tank contacts ignited the methane and blew the walls off the house.

Wes, thanks for the letter and thank you for all the good work you've done at Geoprobe®. I think you guys are great. Tell Tom Christy "Hello", and I really appreciate and admire all your innovations.

Tom

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Clariant Mining Solutions has acquired Chemical & Mining Services, Pty. Ltd, a provider of specialty chemicals and technical services to mining industry clients located primarily in Australia. The company also purchased the specialty mining chemicals business from SNF Flomin, a U.S. subsidiary of the SNF Group.

Additionally, Clariant opened a new Mining Application and Development Center in Tucson, Arizona, and expanded its current facility in Reserve, Louisiana, which is now able to blend chemicals for the mining industry.

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WHO'S IN THE NEWS

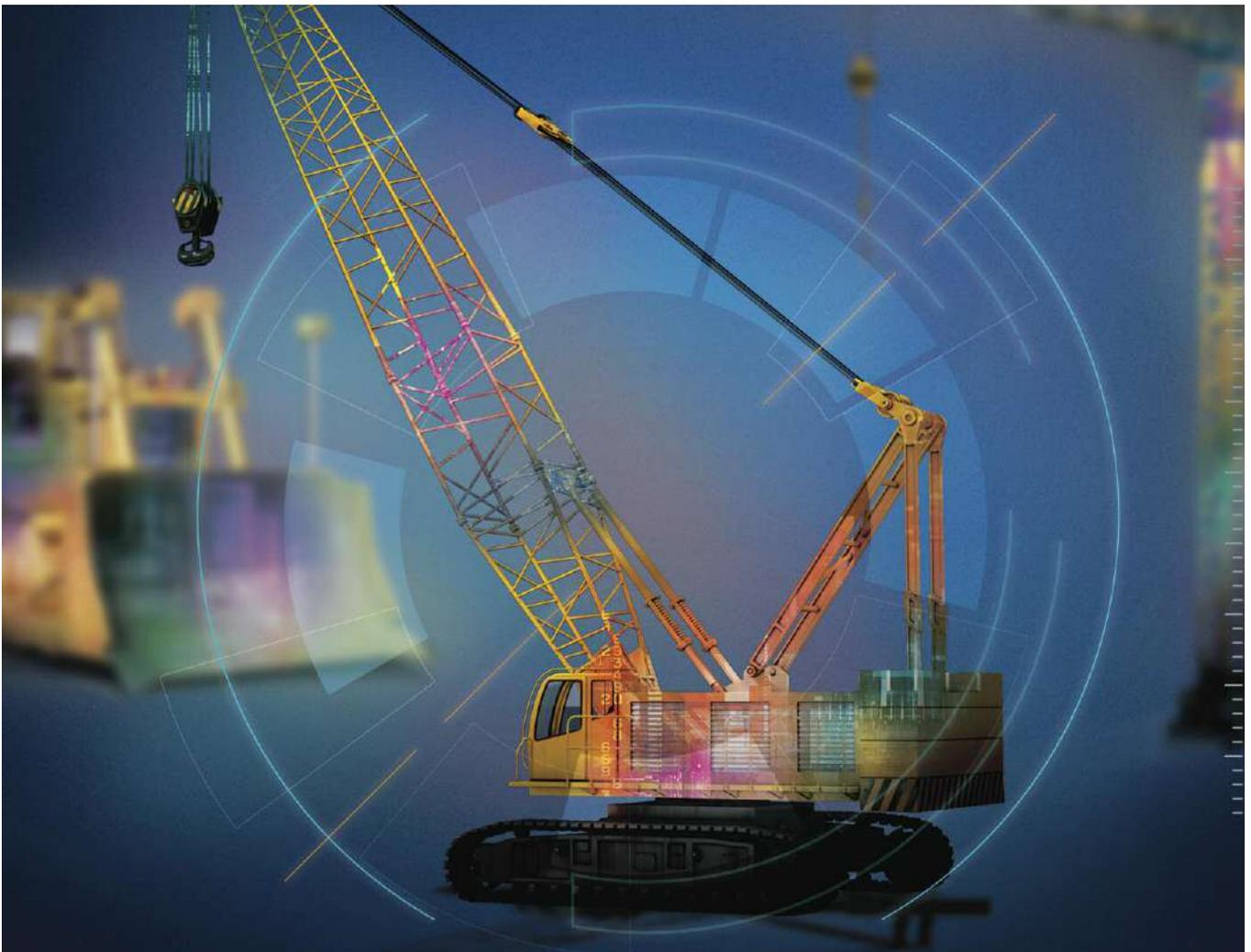


Hole Products announced new additions to the Hole Products Team. Neal Mehlhorn will be heading up a new addition to the Hole Products facilities in Arizona.

With over 25 years of experience in the drilling industry, his work in the different aspects of drilling supply such as warehouse/delivery, purchasing, domestic and international sales, management and contract drilling sales and operations will be a great asset. He is excited to start building an honest and long-term relationship with his customers.

Additional announcements from Hole Products, Mowrey, and Duke Energy are online now at worldwidedrillingresource.info/Whos1.pdf

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“Be Prepared”

by Kyle Rehme

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of real life, how many of us truly heed these sage words today? What about being prepared for things requiring more than a first-aid kit or a trusty rusty pocketknife - but fall short of a cliché *zombie apocalypse*?

I'd wager many of us have a fire extinguisher and a generic first-aid kit fairly handy, and a few resolute readers may even have set aside a full-blown emergency preparedness kit with water and food. They'll be the ones more prepared to survive some severe weather event or community crisis, be it a tornado, hail, flood, blizzard, or maybe extended utility outages, blackouts, or come what may. Nevertheless, what might be the calamities you and I haven't prepared for? What isn't yet in your emergency preparedness kit, but should be?

Specifically, today, how are you prepared for a business emergency? A business disaster large or small which affects only your company, or maybe just a single worker? What could that *bad day* look like for you? How might it affect you and your family personally? Your employees? If, or when, something

does happen, will you and your employees know how to spring into action to reduce your losses and resume profitable business activity quickly? What about maintaining your public image and reputation? Do your employees have the training, direction, and a written game plan to implement in the event of a business interruption of some sort? Do they know your expectations on such a day? The basic question is, "Do you have a defined business continuity plan to prepare for various emergencies?"

Insurance and worker's comp are two critical and essential parts for an intelligent strategy of a broader perspective and called a *Business Continuity Plan* - yet seldom is insurance viewed in that context.

You see, after a *bad day* the thing so special and unique about insurance is it can (and should) be designed to go beyond helping your business survive. Insurance can restore you and make you whole again according to the policy, limits, and how it was designed by someone with your personal expectations and unique risks in mind. Or, on the other hand, business insurance may be viewed with disdain and dealt with half-heartedly only to be tucked away on a shelf with the perception it "won't work anyway". Curiously enough, in either case, the business owner and insurance policy holder has probably set themselves up to be correct! Think about it.

Better yet, act on it! Contact me through *WWR* and I'll e-mail you a five-page *Business Continuity Plan Checklist* to help you get started. No kidding.

Kyle

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

How many of us were Boy Scouts once upon a time and can remember reciting this motto? If you're like me, those words bring back warm memories. However, all these years later, as we each navigate our way through the daily tangles

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Drilling Into Money Not Boring

by Mark E. Battersby

As the 2016 Tax Year Ends

Many of those in the drilling industry should already be turning to their advisors for tips and strategies on how to reduce their drilling operation - and their own - tax bill. Fortunately, every drilling professional has at their disposal several year-end moves to help reduce the annual tax bill. These include deciding a proper time for income and expenses.

Generally, a profitable business will want to accelerate deductions and defer income. By deferring (postponing) income to a later year, it may be possible to minimize the current income tax liability. Thus, when the deferred income is eventually reported, in all likelihood the drilling operation will be in a lower income tax bracket.

Assuming the drilling operation is eligible, cash-method accounting permits micromanaging the operation's 2016 and 2017 taxable income to minimize taxes over the two-year period. If business income will be taxed at the same or lower rate next year, several moves to defer taxable income until 2017 exist:

- ⇒ Pay expenses with checks mailed a few days before year-end. Expenses can be deducted in the year the checks are mailed even though they won't be cashed or deposited until early next year. For big-ticket expenses, sending checks via registered or certified mail is recommended to provide proof of timely mailing.
- ⇒ Before year-end, prepay some expenses. As long as the economic benefit from the prepayment does not extend beyond the earlier of: (1) 12 months after the first date on which the business realizes the benefit, or (2) the end of the next tax year. This rule allows 2016 deductions for prepaying the first three months of next year's rent or insurance premiums for the first half of next year.
- ⇒ The general rule for cash-basis businesses is they don't have to report income until the year cash is received or checks are in hand. To take advantage of this rule, consider waiting until near year-end to send out some invoices

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to customers. This will defer some income until 2017, because the operation won't collect until early next year. Needless to say, this idea should only be used for customers with solid payment histories.

While 2017 is knocking on the door, there is still time to make the moves which could save the business - and you - money. Remember however, all year-end moves work best when discussed with the operation's accountants, tax professionals, and advisors.

Mark

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Construction and Geotechnical drilling will be our editorial focus in February.

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The Un-Comfort Zone II

by Robert Evans Wilson, Jr.

These Stories will Change Your Beliefs about Luck ~ Is it possible to influence luck?

Eight-year-old Julie Amberg was excited when her Aunt Nancy showed up to visit. Nancy, however, wanted some adult time with her sister, so she sent Julie on a mission. "Go outside and see if you can find a four-leaf clover, and I'll give you a dollar for each one you bring me." The odds of her getting a long, one-on-one conversation with her sister were pretty good: studies show there is only one four-leaf clover for every 10,000 three-leaf clovers. A few minutes later, however, Julie was back in the house with a four-leaf clover. Aunt Nancy gave her a dollar and sent her back out again. A few more minutes passed and Julie was back with another. She returned three more times, the final time with a five-leaf clover, which is very rare. Today, Julie is a successful Atlanta-based artist, and she still has an uncanny knack for finding four-leaf clovers. A skeptic, however, might suggest it is her artist's eye for detail which enables her to find so many.

Luck is defined as the chance happening of good fortune, prosperity, or success. I've never been one to believe I was lucky, but I recall reading in 2010 about some scientists at the University of Cologne conducting studies which showed a belief in luck can improve a person's chances to succeed.

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Ron Currens, a technology sales professional in Atlanta, can attest to this: "I have played competitive backgammon for many years and the throw of the dice is central to the game. I have found that if I can convince my opponent that I am lucky, then I often get throws like double-six with far greater frequency than normal. It's as if the expectation of luck affects the roll of the dice in some profound manner."

I've been intrigued about the motivational factor of believing in luck for some time. So, I recently asked some of my friends and acquaintances if they believe they are lucky; if their belief affected their luck; and to share some of their luck stories. I hoped to receive two or three stories, but I was rewarded with dozens. Perhaps I'm lucky after all.

Through my interviews, I noticed some patterns among lucky people, what they consider to be luck, and in what seems to cause luck. I'll share some of those with you, along with some of their stories.

Many responded they didn't believe in luck at all; luck is merely the result of hard work and comes when preparation meets opportunity. Several people told me they don't consider good fortune as luck, but as blessings from God. Others told me they believe their serendipity results from the Law of Attraction. A few simply accept they are lucky without questioning it.

Susie Carter said, "Am I lucky? Yes, I win at everything I try." She started *AlaskaMen* magazine and calendar on her kitchen table in 1986, because she wanted to help the single men who came to her day care center needing child care. It was an overnight success. "I just believed I could help the men find wives if I could figure a way to do it." Susie and *AlaskaMen* have been featured on the *Oprah Winfrey Show* five times, in *Cosmopolitan* magazine four times, *People* magazine three times, and hundreds of other magazines, newspapers, and TV shows worldwide.

One pattern I've noticed is many lucky streaks seem to start after experiencing bad luck such as surviving an economic hardship, or worse a traumatic event like severe injury or life-threatening disease. For Paul Babin, a successful cinematographer in Hollywood, it was getting fired from a job which turned his luck around. He said, "Luck comes when we make

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Wilson cont'd on page 82.



New State Record for Overall Length of a Well

Adapted from a Press Release by ConocoPhillips Alaska, Inc.

ConocoPhillips Alaska Inc. announced it achieved a drilling record for Alaska at drill site CD5 in the Colville River Unit (Alpine) on Alaska's North Slope. CD5 is the first commercial oil development on Alaska Native lands within the boundaries of the National Petroleum Reserve-Alaska.

Doyon Rig 19 drilled a horizontal injection well 26,196 feet, a record for overall measured length of a well for the state. The well was drilled to a true vertical depth of approximately 7400 feet and had a horizontal leg of 17,228 feet. The well took 24 days to drill.

"Longer wells allow the company to access more of the reservoir without increasing the gravel footprint of the development," said Mike Wheatall, manager of drilling and wells for ConocoPhillips Alaska. "Ultimately, longer wells like these could mean more oil produced over a longer period of time."

ConocoPhillips Alaska President Joe Marushack was also pleased. "This exciting drilling record at Alpine is a significant technological achievement. This accomplishment continues our tradition of innovation and developing resources in a way that minimizes impacts to the environment. It's something I'm very proud of, and I congratulate our drilling employees and contractors for their excellent work."

Alpine was the first North Slope field developed exclusively with horizontal well technology. More than 60 square miles of subsurface can be accessed from a single drilling pad. Wheatall said advanced technology developed since oil was first struck at Alpine in 2000, has enabled longer wells capable of accessing more of the oil bearing zone in a field.



Editor's Note: In between our print issues, the *WWD* 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

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Environmental Monitoring

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



Be Careful - Don't Collapse the Casing or Screen

Although it doesn't happen often, well casing and screens can collapse. Unfortunately, the repair is not easy either. Collapse is often due to a difference in pressure between the outside of the casing, and the inside of the casing. Although steel is relatively strong, the wall thickness and depth at which it is set, also factor in to the pressure differential. Also remember, for any given wall thickness (Schedule 40, SDR-21, etc.) the larger the diameter, the "weaker" the pipe, i.e., a one-inch pipe is more difficult to collapse than a 24-inch pipe of comparable wall thickness.

Drilling through consolidated rock (limestone, shale, dolomite, etc.) is likely to maintain a rigid borehole and less likely to collapse, than a borehole drilled through unconsolidated sands and gravels. Loose sand and gravel can collapse; and the deeper the hole, the greater the pressure on the outside of the casing or screen. By the same token, heavy drilling mud or neat cement can exert a very high pressure on the outside of a casing and become an issue beyond a few hundred feet.

Well screens are relatively weak and subject to collapse if set very deep in unconsolidated formations or when long sand/gravel packs are placed outside the screen. Also, in some cases, deeply screened wells in low-yielding aquifers which drawdown to deep depths, the drawdown inside the well/screen can create enough pressure differential on the outside to collapse the screen.

Another scenario to consider is the grouting of PVC well casings. When neat Portland cement is mixed with water, an exothermic reaction occurs where heat is generated. Neat Portland cement with a thick cemented annulus (greater than 2 inches) can reach 160°F (71°C) or more. If calcium chloride is added to accelerate the curing, the temperatures can reach 200°F (93°C) or more, making the PVC more soft and pliable and can cause the PVC to become "oval" shaped which may hinder setting the pump.

Tom

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

I enjoy reading the *WorldWide Drilling Resource*® publication even though my company is not directly in the drilling business. I look forward to reading Tim Connor's articles. I am happy to see a publication in the industry that is far-reaching to individuals who may also see these articles and be positively influenced.

Jennifer Chilcote



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Geotechnical Investigation Goes to the Hogs

Compiled by **Bonnie Love**, Editor, *WorldWide Drilling Resource*®

The Arkansas Department of Environmental Quality (ADEQ) announced plans to drill for soil samples at the C&H Hog Farms near Mt. Judea.

The farm is owned by three local families who have lived in rural northwest Arkansas for eight generations. In 2013, they expanded their hog production by building a farm and incorporating the latest design elements, including environmental safeguards exceeding state or federal government requirements. Although they followed all permitting requirements and received approval from the state, people in the area are not happy.

Local residents and environmental groups fear hog waste could potentially contaminate the area's watershed. The farm is located on Big Creek, roughly six miles from where it joins the national Buffalo River. Despite preconstruction geotechnical borings indicating there are no karst features beneath the facilities or ponds, some fear the porous limestone and karst topography located in much of northwest Arkansas, could be present and ultimately, waste could seep into the region's groundwater supply, and possibly the river.

Environmental groups are now demanding additional testing, and the owners of C&H are cooperating. The farm has already taken preventative measures by adding synthetic liners and covers to manure ponds and installing leak detection equipment at the farm's waste-holding ponds. Additionally, the University of Arkansas

is monitoring the water quality in tributaries to the Buffalo River and in the river itself to see if the farm has had any impact.

So, the decision has been made to use a sonic drilling rig to drill a 120-foot boring in the vicinity of the waste storage ponds to evaluate the subsurface conditions. Soil samples will be collected at five-foot intervals for analysis of potential analytes of interest. Any groundwater encountered while drilling the boring will also be sampled.

Upon completion of the borehole, geophysical logging will be conducted including natural gamma and neutron logging. To ensure objectivity, all work will be conducted under the observation of ADEQ and Tai Hubbard, a professional geologist and independent karst geologist.

Hubbard is certainly qualified with more than 15 years of experience on a variety of environmental and geotechnical projects, resulting in the management and oversight of over 5000 feet of sonic drilling. He started his career as a drilling

Geotechnical Investigation cont'd on page 68.



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Top Construction Companies Head to Italy

Adapted from a Press Release by SaMoTer, International Earth-Moving and Building Machinery Exhibition

Some of the top players in the earth-moving and construction market are planning to attend the 30th SaMoTer, the triennial event scheduled at Veronafiere, Italy, February 22-25, 2017.

SaMoTer has been a landmark event in Italy since 1964, for the construction equipment sector. The coming date at the Verona Exhibition Centre will focus on the management and prevention of environmental emergencies, and is scheduled in conjunction with Asphaltica, the exhibition dedicated to technologies and solutions for road paving, safety, and transport infrastructures, and Transpotec Logitec, the transport and logistics event.

A change in direction for production and purchase of machinery and equipment in Italy, after the low point posted in 2013, is demonstrated by the latest data analyzed by SaMoTer-Veronafiere Outlook. In fact, exports in the first four months of 2016 were up by 1.6% compared to the same period last year.

Enrica Oderda, Italy Business Director of CASE Construction Equipment said, "The Italian market is experiencing a significant growth trend: +28% in 2015 compared to 2014, and further improvements in 2016. This increase is stimulating a climate of confidence among dealers and customers, within a virtuous circle that we are sure will strengthen the recovery. CASE believes in Italy and demonstrates this belief by upgrading its production centers in San Mauro Torinese (excavators) and Lecce (wheel loaders, compact wheel loaders, backhoes, and graders). Attendance at SaMoTer by CASE bears witness to its confidence in the Italian market and support for our customers and network thanks to our full-liner offering, at the same time as focusing on the specific features of the Italian market with compact excavators, triple boom systems, and short radius versions."

Several companies are coming to realize the advantages of attending SaMoTer. Makoto Kato, managing director of Kobelco Construction Machinery Europe said, "Kobelco will exhibit for the first time ever at SaMoTer 2017. For our company, Italy is a new strategic market. Over the past 12 months, demand for mini excavators and heavy-duty earth-moving machinery has increased."

The previous edition of SaMoTer witnessed over 40,000 attendees from over 55 countries visiting more than 450 exhibitors from nearly 30 countries, and SaMoTer 2017 is sure to see even more!

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Water For Life International

by *Tim Rasmussen*

The days have passed and the year is coming to an end. This means another container will be leaving for Guatemala filled with material to support our work there. The shop at Gary Bartholomew's is filling with donated items and purchased supplies. The date has been set for shipping and the vessel booked for the shipment.

This fall, we are sending a little earlier than usual because we want to avoid the holiday vacations which have an effect on the importation process. Many workers are gone from their jobs, and delays can result in the process. There is a daily cost (\$125) for having the container in the port, and we want to avoid the fee if possible.

We are also going to ship to the eastern port of Guatemala, Puerto Barrios. This is the largest port in the country and there are banks where payments can be made for the various charges. Previously, when we shipped into the port on the Pacific side of the country, Berny would have to make the trip back and forth from the port to Guatemala City to make payments. This delay was caused because there was no bank in the port city.

Water For Life (WFL) has 89 wells in operation in Guatemala. Most are in remote villages where there is no grid power. A few are solar powered, but most are hand-powered pumps. The people are happy to work for the clean water, and many walk a long way every day to get to it. The pathways from the wells look like the spokes of a wheel leading from the pump into the jungle. Many wells have lines of people waiting to get water all day long.

WFL is devoted to the sustainability of the water sources. We have trained Berny and his helper Samir to make repairs to the pumps in the villages. Generally, within a day or two of a call from a village saying there is trouble with the water, Berny and Samir take the pump service truck and head off to make the repairs. The villagers are very happy.

People ask why we can't just train villagers to keep their own pumps working. The answer is the very specialized technical knowledge and equipment necessary to make repairs to the pumps is not easily transferred to people who speak a native dialect and cannot understand what we are saying to them in Spanish, let alone English. They do understand the water and thank us for it.

We need your help. If you want to have an adventure and have a heart for helping people, please contact WFL. We have a place for you. If you cannot come, please support WFL.

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



This village pump was donated by KEEH, a Spokane, Washington, radio station, as a result of a phone-a-thon benefit held for WFL.

Tim

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

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A Perfectly Straight Hole, Part 2

by Art Beatty
Antofagasta,
Chile

When we had drilled down a little ways, we hit something extremely hard. This was a surprise for me, and also for the geologist at Ray Mines. If I remember right, we were doing that part of the hole by the hour. We tried everything. We even used cement, but after hardening, it would just kick it off again. So we ended up going around it. The quartzite was really hard and abrasive. I had some experience with it using a down-the-hole hammer. It would take a bit like it was running on a grinding machine. The hammer bit wouldn't last any time at all.

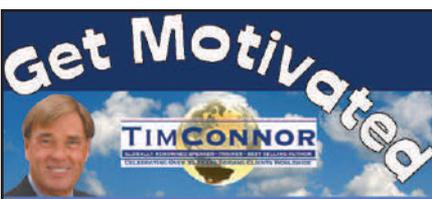
The geologist suggested they get one of their hammer drills they used for blasthole drilling. You know, the type that stays on the rig and you just drive on the drill pipe for small-diameter holes in construction or whatever. He also suggested putting a half a stick of powder in it to blow the corner off, then we'd have it made. I thought it might be an idea, so we moved the rig over and got the other one in there on an angle. The guys were really good to work with and we were able to use the hammer bit to drill a little, put in some dynamite, and sure enough blew the corner off. Then we went down and finished the hole. When we reached the bedrock, I called the people we were getting the casing from and told them we were ready for it, but they said they couldn't locate it. They said it would take quite awhile to find the aluminum and put the threads on it like we needed. He asked if I could try PVC. Oh boy! So I called the office and told them the situation. They said to go ahead and give it a try.

Each morning, a survey crew would come out to see if the rig was perfectly straight and that the kelly was exactly where it was supposed to be. We hung it in the hole and got it exactly straight and we would put on enough extra square drill pipe to go ahead and, when we were satisfied it was perfectly straight, we poured cement around it. The mine had a little cement truck, which they brought out. I forget now how many days we let it set, but when we went to take it out, it wouldn't pull. We were cemented in the hole. I thought it was really going to be fun now!

So I contacted Christensen Diamond Products, which Boyles Bros. was a part of at the time, and told them what was going on and how urgent it was. I also called my boss in Phoenix to tell him we would have to work through the holiday (I think it was Labor Day) since we only needed a few pieces in short length. We managed to get it done, anyway. So we drilled over with this stuff and we pulled it all out of the hole. When it was cleaned up, we had a good cemented hole. Then we started drilling from there. It wasn't like coming out of a rifle barrel or anything like I wanted it to, but we barely let the bit touch the surface and we got down and surveyed it again, and low and behold, it stayed on good enough. We were off and running. We surveyed it every 50 feet and it's about all we put on one of those bits. With the rock, it was just getting started - it wasn't hard at all. It was very good rock to drill.

We would pull up if I thought it was taking too much weight - not holding most of the drill collar weight back. We would survey it a little early. One time it got off just a little bit, so I slacked off and surveyed it again, and it seemed to be right on. Well, we carried that part of it down to a mine opening where an old wooden flume was. It was there they wanted to get the water out. They were afraid it was going to cave in, so they wanted the hole. When we were within 15 feet of getting through, the superintendent of the mine told us to put the rig on standby so he could get an oriented survey run.

They brought in an oilfield setup and they went inside of our drill pipe and took a survey of the hole. Afterward, we all went to the office to interpret the deviation of the hole. He told me he had been surveying holes for 20 years and always thought it was impossible to drill a straight hole, but he had learned something on this job. He said it was about the straightest hole he had ever seen. He knew it wasn't very deep, and said it was like a post hole to those in the oilfield, but at that, it was the best he had seen.



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Frequently-Used Geological Terms Part 56

Glossary Adapted from the Dictionary of Geological Terms

N



Nickeline from Morocco, Museum des Sciences Naturelles in Brussels, Belgium.

closed loops of circuits are formed or so arranged as to provide a check on the consistency of the measured values.

Nickeline - A pale copper-red hexagonal mineral. It is one of the chief ores of nickel and may contain antimony, cobalt, iron, and sulfur.

Nonmetal - A naturally occurring substance without metallic properties such as high luster, conductivity, opaqueness, and ductility. In economic geology, the term is used to define any rock or mineral mined for its nonmetallic value, such as stone, sulfur, or salt.

Nontronite - An iron-rich mineral of the smectite group.

Norite - A coarse-grained plutonic rock containing labradorite as the chief constituent and differing from gabbro by the presence of hypersthene as the dominant mafic mineral.

Novaculite - A dense, hard, even-textured, and light-colored cryptocrystalline siliceous sedimentary rock, similar to chert but for the dominance of microcrystalline quartz over chalcedony.

Nucleation - The beginning of crystal growth at one or more points.

Nugget - A waterworn lump of placer gold or other metal.

Nummulite - Any foraminifer (single-celled planktonic animal) belonging to the Nummulitidae family, characterized by a planispiral coin or lens-shaped test.

Nummulitic Limestone - A sedimentary rock composed chiefly of nummulite shells. It is a thick, distinctive stone, widely distributed throughout the Eocene Formation stretching from the Alps and northern Africa to China and eastern and southern Asia.

Look for more terms next month!



Nephrite - An exceptionally tough, compact, fine-grained, greenish or bluish tremolite or actinolite, constituting the less rare kind of jade.

Nested - Term used to describe volcanic cones, craters, or calderas occurring one with the other. Also said of two or more intersecting calderas.

Net - In structural petrology, a stereographic or equal area projection of a sphere in which the network of meridians and parallels forms a coordinate system. It is used to plot points representing lineations, the normals to foliation, or crystallographic directions. Also refers to a series of surveying or gravity stations interconnected in such a way that



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My Family Lost More than Just Coal

by Carlee Jlynn Smith Courtesy of theodysseyonline.com

As the last few years have passed by, life in the Appalachian Mountains has been changing. The mineral that used to be the heartbeat of our region is almost obsolete. When I was a child, the entire idea of coal always fascinated me. The way it was mined and pulled out from the ground to be turned into electricity was intriguing. I can remember driving by various coal fields, seeing the black gold stacked high, and always asking my dad where it was going or how much it was per ton. Obviously, these things would not matter to a child who was not raised with something so dark bringing life to their family.

When I drive by places where mountains of coal used to stand tall, there is nothing. On the ground lay the remnants of what used to be full of life. As I pass by places where my dad used to "head under the hill", I see locked up fences and emptiness. No longer do I see mining equipment being moved down the highway. When I was younger, I would always ask, "What does that do, Dad?" Of course, I would always get an answer, and now I know a decent amount of information about underground mining. Today, I only pass 8-10 coal trucks on my 40-minute commute to school, I used to pass at least 30. Trains no longer pass loaded full of the mineral which had been so rich in our area for years.



Carlee and her father Glenn Smith, P.E., vice president business improvement with Nyrstar US, Inc.



Carlee recently celebrated her graduation from nursing school with her father Glenn, brother Taylor, and mother Carla.

See, when my family lost coal, we lost the lifestyle we had known for many years. We lost the comfort of my father in our own home, as he had to start working away. We lost dirty boots sitting beside the front door. We lost the coal dust that graced our faces as we welcomed a kiss on the cheek when my dad walked through the door. We lost the sludgy remains from a long day that used to lay in our driveway that would fall from my dad's work vehicle. Even years after my dad has been out of the mine, his hands are still stained with the black dust he left years ago. We may have lost all of these things, but what we will never lose are the lessons coal taught us.

Covered boots showed me that sometimes you have to walk through a lot of sticky situations in life. No matter how dirty your clothing or boots may be, when you take them off, your skin can be washed clean. No matter what you walk through in life, stay true to yourself because who you are on the inside is what really matters.

Hugs that get your clothes dirty and kisses that leave coal dust on your face may be a little annoying but, in all honesty, they are the best kind. Running and hugging your dad, brother, husband, or grandfather after a long day in the mine is a stain Clorox® will never be able to remove. Those are the kinds of things that remind you what love in a family is supposed to be like, something that cannot be washed off and remains forever.

The dirty concrete on our driveway never seemed to bother me. While my dad was off at work, the muddy mess reminded me of where he was and what he was doing. It reminded me that even after a long day, full of dirt, life-threatening situations, and being in the dark that he still came home. I always knew my dad was never scared of the dark because he was a coal miner. He had his lamp and even when he did not he would always check around the house if we heard noises late at night.

So, now I can still look at my dad's hands and see the reminders that many years of hard work have gotten him where he is. To me, that is an inspiration to never give up and to always chase your dreams. As a man would head into the mine, he would leave his family, face the darkness with his coworkers, and never know if he would return. Learning about coal mining and the challenges miners face every day taught me a lot about life. Sometimes it takes walking into the darkness of challenges, not knowing when you will come back out but going anyway, to get through this crazy thing called life.

My family lost more than just coal, but the lessons it taught me will remain forever. What I was raised to know has allowed me to be the person I am today. I am proud to say for many years of my life that I was a coal miner's daughter.



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Running Foam from the Get-Go

by John Christ, J.C.'s Drilling Consultant

If you are going to drill with air, you should really consider running foam from start to finish. It will keep you from getting into trouble. Is saving money in your overall drilling costs going to hurt your feelings? We all know fuel is a big part of drilling costs. Most of the time, foam has only been used to help get us unstuck. I have always said drilling fluids, if run correctly, are like insurance. Foam is your drilling fluid for air drilling, but why drill with air?

First and foremost, it is the fastest method of drilling a vertical borehole. You will have the possibility of running a hammer. It will give you instantaneous formation evaluation. When the formation changes, you will know right away. If you encounter a zone which takes your circulation away, foam may just be your savior. It is also a very flexible medium to drill with.

Let's talk about this. If you are in rock from the start, straight air with an uphole velocity of 3500 to 7000 feet per minute may be just what the doctor ordered. How often does this happen?

If dust is an issue, injecting water may be the answer. Careful, it may cause your cuttings to ball up; or if there are clay stringers, they may want to start swelling and get sticky. The next step would be to start running foam. Advantage is cost savings by reducing fuel costs. Every time you thicken your air steam, you have to reduce your volume of air. Remember, there are three phases to your fluid: air, foam, and cuttings! They all have to come up at the same time. This does take some practice to perfect. You will notice you have increased carrying capacity and better borehole stability. The next step would be stiff foam. The formation is changing and so must our fluid, which is foam going from a dish soap consistency to a shaving cream-type foam. Remember we have thickened the air column and will have to reduce the air volume, again. There will be another increase of carrying capacity and borehole stability.

The next step is gel foam. The formation is telling us a filter cake would be beneficial. The need for a filter cake means the formation is getting more unconsolidated. A filter cake is needed for stability to help keep the borehole from falling in and increasing the carrying capacity.

The biggest problem I have seen in the field is incorrect concentration and consistency. By consistency, I mean making sure concentration being pumped is the same. You have your 55-gallon drum. I prefer plastic - it's lighter and doesn't dent. You made a line at the 50-gallon mark. You fill up with freshwater to this point and grab your foam . . . STOP! Did you forget a step? Pretreat your makeup water. Just like salt makes food taste better, soda ash helps make better drilling fluids. How much? There is a formula, $0.0095 \times \text{total hardness in ppm (parts per million) equals pounds of soda ash per 100 gallons}$. Normally, $\frac{1}{2}$ to 2 pounds per 100 gallons is what I see.

Okay, now grab the foam and add it. Just blend it in with a boat paddle or shovel. You want it to foam down hole, not on the surface. We run 1 to 4 quarts per 100 gallons. Remember, we are 50-gallon batches, so cut it in half. For a stiff foam; pretreat makeup water, then mix the polymer, and blend in the foam. Which polymer? I always use a polymer which will help control formation, so I believe PHPA (partially-hydrolyzed polyacrylamide) polymer for clay formations and PAC (polyanionic cellulose) polymer for unconsolidated formations. As for gel foam, pretreat makeup water, mix bentonite, polymer of choice, and blend in foam.

Back to consistency, when a drum is almost empty, what do you do? Stop drilling and mix more? Not that I have seen. Operator is drilling, helper adds water, puts in a couple plugs of foam. This changes everything! Answer = get a second drum. It can be mixed and ready to go, saving time and providing a consistent mix down hole.

Now you are drilling much better holes and creating a heck of a lot of foam. How do you deal with it? Hay bails and defoamer is a good start. Make a diverter with a defoamer injector, but the problem is you can't see how your three phases are coming up. Never, ever let foam get into a waterway! This will give you more problems than you want. Now go out and drill with air effectively in all kinds of formations!

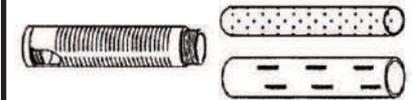
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Simplify Installation and Maintenance

Adapted from Information by Merrill Manufacturing courtesy of Power PR

While water well drilling and pump installation contractors have access to products at local hardware stores, big box stores, or regional wholesalers, they are often exposed to a fraction of what is actually available. Retailers typically offer only a few of the most common items, and wholesalers tend to lead contractors to the products they stock.

The complexity in most water well systems begins with the numerous parts needed to integrate the well, pump, water storage tank, pipes and fittings, as well as the water distribution line. Adding to the challenge are the various codes and design options required to meet strict federal, state, and municipal regulations.

A growing number of contractors are demanding suppliers offer a more comprehensive list of parts and accessories to enable installations and maintenance to be simplified. "As proactive contractors look beyond the usual parts and accessories, they are finding attractive options they never knew existed," said Danny Ahrens, owner of Florida-based Water Products Marketing, a supplier of water well equipment to distributors and contractors. "Innovation is helping them to install water well equipment more efficiently and cost-effectively while at the same time improving quality; and that gives them an edge in the market."



Some contractors use the same standard parts and accessories their mentors or fathers did, however, this is not always the best idea. Trying more effective nonstandard parts can dramatically cut installation times, among other benefits. For example, instead of installing a traditional control box and pressure switch, which involves running wires between them and fitting all the connections in an undersized case, contractors could

use a control switch. This innovative device combines a three-wire control box (with start capacitor, relay, run capacitor, and a wire terminal strip) and a pressure switch into one easy-to-install device, eliminating the time it takes to install and connect a pressure switch and a separate control box.

Merrill Manufacturing offers a heavy-duty pressure switch for longer life, an extra large case for easy wiring, and heavy brass wire connections which can hold #4 wire. "Instead of a standard pressure switch and control box, installers are finding that Merrill's control switch can act like a junction box," stated Ahrens, who has been involved with more than 50 field installations with the device, some operating for nearly ten years. "The design reduces the amount of required connections - including conduit, fittings, washers, and lock washers - by half," he explained. This speeds installation up to 50%, extends service life, minimizes time-wasting nuisance calls, and eliminates issues related to start capacitors and relays.

Since the control switch works with all brands of motors, it also reduces the inventory of replacement parts contractors must bring to the jobsite.

Simplify Installation cont'd on page 62.



Minnesota Water Well Association 95th Annual Trade Show & Convention

January 22 - 25, 2017
Minneapolis Marriott Northwest
Brooklyn Park, MN

Schedule

Sunday: Exhibitor Set-up, MWWA Board of Directors Meeting, and MWWA Hospitality.

Monday: Classes and McElhiney Lecture, Trade Show, Ladies Program, Awards, Banquet, and Casino Night.

Tuesday: Speakers and Classes, Annual Meeting, Past Presidents Meeting, Final Board Meeting, and Plumbing Class (Pt. 1).

Wednesday: Plumbing Class (Pt. 2).

For more information, visit: www.mwwa.org



Safety Spotlight: Around the Rig

by Scott Cosby

In this month's article, we'll focus around the rig. The seasons are changing; for some of us in the industry, work slows down. This is a good time to check over the rig for safety issues. Safe drilling operations depend on the drill operator and crew knowing what's going on around their rig.

Here are a few helpful tips for keeping drilling safe and efficient, concerning the drill rig itself:

- Safe and effective storage of all rig tools and supplies to be easily handled without accident.
- Don't store and transport tools and/or supplies on or near the rig's mast unless there's a storage location there.
- Keep all drill pipe, augers, and other such rig tools in the manufactured racks on the rig, and stacked in an orderly manner.
- It's important to keep all access (e.g. platforms, walkways, etc.) on and around the rig free of debris and substances which could produce a hazardous situation.
- All drill rig controls, displays, and warning indicators should be clear of any substances, such as dirt, grease, etc.
- Store any fuel in properly labeled containers in support vehicles, with proper ventilation.
- Keep all drilling fluid and materials such as borehole chips in a support vehicle or storage location on the rig, if possible. Make sure these items are properly labeled and stored.

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NGWA EXPO

- Maintain a clean drill truck cab of dirt, mud, and trash for safe and effective use.

These tips are common sense, but necessary for safe and efficient drill operations. The more we learn, practice, share, and mentor each other on the aspects of safety in our workplace and lives, the safer we become.

There are also wide varieties of online sources concerning this topic, as well. Provide in-house training to all drill operators and crews concerning this topic.

Scott

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

Folks who never do any more than they get paid for, never get paid for any more than they do.

By working faithfully 8 hours a day, you may eventually become a boss and work 12 hours a day.

Where are you planning to go? How about including these shows:

Join WWD

Get ready for the 37th Annual Utah Ground Water Association Conference & Expo, January 11-13, at the CasaBlanca Resort & Casino in Mesquite, Nevada. This is an amazing opportunity to receive the latest education, information, and new product displays to keep you at the top of your business.

The event starts with a golf tournament on Wednesday. A morning skeet shoot happens Thursday, followed by the trade show opening, continuing education classes, and a vendor social in the afternoon. The banquet and scholarship auction begins at 6:00 p.m. More seminars and expo times are set for Friday.

Visit www.utahgroundwater.org for more information.



The 2017 Oklahoma Ground Water Association Annual Conference is January 10-11, once again at the Embassy Suites Hotel & Conference Center in Norman, Oklahoma. The program of speakers and exhibits on Tuesday will run from 8 a.m.-5 p.m., with lunch included. The reception begins at 5 p.m. Wednesday's schedule is 8 a.m.-Noon.



Look for updates at www.okgroundwater.org

HEADS UP! The Empire State Water Well Drillers Association Annual Meeting has a new format and change of venue to the Turning Stone Resort Casino in Verona, New York, January 17-18.

The Board of Directors meeting will start at 9:00 a.m. on Tuesday, followed by concurrent training sessions. Learn about troubleshooting water systems, getting the most from your drill rods, pump panel controls and troubleshooting, and more. The trade show opens at 4:30 p.m. with a vendor cocktail party and auction to benefit the Water Systems Council Water Well Trust. The general meeting will be held on Wednesday with several speakers presenting. Go to www.nywelldriller.org



The Minneapolis Marriott Northwest in Brooklyn Park, Minnesota, is the place to be January 22-25, for the 95th Annual Minnesota Water Well Association (MWWA) Trade Show & Convention. Registration opens Sunday at 1:00 p.m. with the board meeting to follow at 2:00. MWWA's hospitality event begins at 5:00 p.m. and will have live coverage of the pro football championship games for enthusiasts.

Monday has seminars, including the McElhiney Lecture, until noon when the trade show floor opens. The ladies' program is from 10:00 a.m.-1:00 p.m. Dinner, awards, a slide show, and more starts at 5:30 p.m. followed by casino night. Tuesday is filled with updates and meetings, plus part 1 of the plumbing class begins at 4:00 p.m. Part 2 of the plumbing class will cover code updates on Wednesday.



For additional information, visit www.mwwa.org

Another fantastic Texas Ground Water Association Annual Convention & Trade Show will be held January 24-27, at the San Marcos Embassy Suites & Conference Center, in San Marcos, Texas. As always, there will be many displays of the products and equipment needed to successfully complete your jobs, educational seminars to keep you up to date and informed, industry awards, golf, bowling, banquet, and a scholarship auction.

Don't delay, go to www.tgwa.org today!



Mark your calendar for the 43rd Annual Conference on Explosives & Blasting Technique hosted by the International Society of Explosives Engineers January 29-February 1, at the Caribe Royale All-Suite Hotel and Convention Center in Orlando, Florida. (Blasters Weekend is January 28-29, along with the 15th Annual Clay Shoot.)

The conference is packed with workshops, panel discussions, student industry connection, technical sessions, industry exhibits, Basters R Us Video Roundup, meetings, luncheons, and banquet.

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Everything you need for trenchless or open-cut construction and pipe rehabilitation can be found at the Underground Construction Technology International Conference & Exhibition January 31- February 2, at the Fort Worth Convention Center in Fort Worth, Texas. Tuesday and Wednesday are set up the same with education classes from 8:30 a.m.- noon, followed by the exhibit area opening to display the latest equipment and technologies designed for safety and productivity. After breakfast on Thursday, the exhibit hall opens from 8:00-11:00 a.m., with seminars running from 8:30-10:00 a.m.

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NGWA CEO Steps Down After More than 34 Years

Adapted from a News Release by the
National Ground Water Association

After more than 34 years of combined employment by the National Ground Water Association (NGWA) and its subsidiaries, including more than 20 as the chief executive officer, Kevin McCray, CAE, informed the NGWA Board of Directors of his retirement as the Association's CEO effective December 31, 2017.

"I am humbled and gratified by the many diverse opportunities afforded me during my service to the Association's membership, as well as to the larger global groundwater community," McCray told the Board. "All in all, everyone has been an honor to serve. It has also been my special reward to work beside exceptionally dedicated and member-focused staff colleagues throughout my NGWA career. I am confident I learned far more from them than ever could be tallied. They are NGWA, through and through."

McCray first began work for the Association in 1979 as an assistant editor in its publishing subsidiary. From 1983 to 1985, he worked for an industry manufacturer, and returned to NGWA in December 1985, serving in a number of roles until being named the Association's executive director in August 1995. He also serves as the chief executive of the Association's foundation.



With McCray at the helm, NGWA has accomplished a multitude of achievements impacting the groundwater community in the last 20 years. Among them are:

- Publishing an industry standard in 2014, the ANSI/NGWA-01-14 Water Well Construction Standard.
- Developing a set of industry best suggested

practices which currently numbers 19 with more in development.

- Hosting numerous national and international professional development opportunities, including events in Australia and Panama.
- Having NGWA work with several federal agencies, including the U.S. Environmental Protection Agency, on a variety of programming benefiting the groundwater industry and well owners.
- Invigorated its charitable foundation, creating several endowed funds which have awarded tens of thousands of dollars in grants and scholarships.
- Hosting its largest annual exhibition, the Groundwater Expo in 2004 with 5959 attendees in Las Vegas.
- Seeing its technical journals, *Groundwater*® and *Groundwater Monitoring & Remediation*®, grow in international recognition with hundreds of thousands of articles downloaded annually from researchers all around the world.
- Developing a program for well owners to become better stewards of groundwater with a website and other material specific to homeowners utilizing water well systems as their daily source of water.

NGWA Board President Jeffrey Williams, MGWC, CVCLD, is activating a task group from within the Board of Directors, which will meet to review a recommended transition timetable and related actions, as well as expectations for the future CEO. He anticipates the search beginning in the first quarter of 2017. NGWA is not currently accepting résumés and is not taking calls or e-mails about the position at this time.

Williams anticipates the new CEO will assume his or her duties in conjunction with the 2017 Groundwater Week annual meeting and trade exposition December 5-7, 2017, in Nashville, Tennessee.



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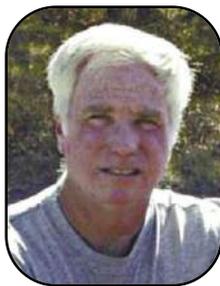
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Given Enough Thrust, Pigs Fly Just Fine

by Britt Storkson
Owner, P2FlowLLC

With sufficient thrust, pigs fly just fine. However, this is not necessarily a good idea. It is hard to be sure where they are going to land, and it could be dangerous sitting under them as they fly overhead.

Quoted from: *The Twelve Networking Truths Applied to Information Security*

The above philosophical statement could be interpreted various ways, but I think what it's saying is, some projects are simply not worth the effort applied to them because the basic concept or working components is/are flawed or unsuited for the task at hand. In other words, it's a pig. Sure, with enough effort, time, money, blood, sweat, and tears we might get it to work, at least in part. But who wants to waste all of those resources on a pig?

I can cite many examples, but I'll use my wife's car as a case study. Her car has a six-speed automatic transmission which works fine except for one thing: There are times when it will not upshift out of second gear. Normally, when one stops, the transmission shifts into first gear, and when accelerating from a stop, the car's computer smoothly upshifts through the gears, eventually getting into sixth gear to keep the engine RPMs (revolutions per minute/motor speed) in the good fuel economy range.

However, once in a while it will refuse to shift out of second gear even though the driving conditions warrant it. I discovered this while driving the car and I noticed the engine RPMs were unusually high even though we were not going very fast down the road. I tried manually shifting, but nothing worked to make it upshift correctly.

Finally, I pulled over and asked my wife to let me see the car's owners' manual. Sure enough, it contained a statement saying on occasion the car, for no apparent reason, would refuse to upshift out of second gear. The carmakers' solution was to turn off the car and turn it back on again to "fix" the problem. I did this, and the car returned to normal operation.

While this was not a problem in that it did not affect the safety of the car occupants, it was a problem in that it should not be doing it. It was a problem in that high engine speeds increase wear and tear on the engine and reduces fuel mileage. Most of all, in my opinion, it was a problem in that the car driver should not have to spend time and effort on something which should have been tested for and corrected in the design stage long before they started selling this automatic transmission.

I think computers are great, which is one of the reasons I've been making them for so long. But to be a worthwhile investment, the computer must relieve the owner/operator of the need to do certain tasks . . . not add to his or her list of things to do. When this happens we, in a sense, become slaves to the computer. The computer is supposed to be a slave to us, not us to them. Humans are supposed to be occupied with "higher level" things a computer cannot do. We don't need to waste our time "cleaning up the messes" caused by a poorly designed and programmed computer. In this case, if the computer is not going to shift the gears correctly every time, then why have it?

While the consequences of this example were only lower fuel economy and increased engine wear, what if this computer malfunction presented a safety issue? What if this computer was tasked with alerting workers of hazards and, from time to time, it did not do it? Or, perhaps worse, what if the computer generated numerous false alarms and then nobody believed it when a real hazard was present? One could argue, having no computer is better than having one you cannot trust.

I spend far more time testing my computers and software than I do making them. And this is the way it should be. Testing is an expensive and time-consuming process, but it's worth it. This way I don't end up with a pig.

Britt

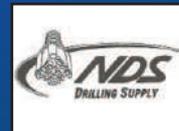
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ONTARIO WELCOMES NEXT GENERATION IN MINERAL EXPLORATION

Adapted from Information Provided by the Ministry of Northern Development and Mines



Mineral exploration could boost Ontario's economy.

The enterprise attracts companies to actively engage in training for Indigenous skills or capacity building with various incentives. The province will partner with OPA to conduct the Prospecting Training Program (PTP), which is a five-day course open to members of the public with an interest in becoming prospectors. Training will also be available in 11 Indigenous communities within Ontario.

Both JEAP and the PTP are components of Ontario's Mineral Development Strategy (MDS), which is a 10-year vision to elevate the province to a position as a global leader in sustainable mineral exploration and development. The MDS works off of a commitment from the Growth Plan for Northern Ontario, an organization which strives for a globally competitive economy by supporting people and communities while renewing and expanding modern infrastructure and aiming for a healthy environment. Ontario was a leader in Canadian mining exploration spending, with a bill totaling over \$390 million and making up nearly one quarter of the country's total. The reported value of Ontario's mineral production was \$10.8 billion last year, and the region accounts for roughly 25% of mining jobs within the country. The mining industry is the largest private employer of Indigenous peoples in Ontario.

Backing mineral exploration initiatives in Northern Ontario is a piece of the government's plan to build up the economy as well as create jobs. The four-part strategy includes investing in talent and skills by helping more citizens find and create the jobs of the future via access to top-quality second-level education. This is the largest investment in public infrastructure to date, with the plan also investing in a low-carbon economy driven by innovative, high-growth, export-oriented businesses. The government's hope is working Ontarians will be able to achieve a more secure retirement.

Canada's province of Ontario is eagerly supporting mineral exploration work by junior exploration companies, even providing training opportunities for new and potential prospectors. Having partnered with the Ontario Prospectors Association (OPA), Ontario announced a \$5 million investment thanks to the Northern Ontario Heritage Fund Corporation. The region's plan is to debut the Junior Exploration Assistance Program (JEAP) next spring. As quoted by Garry Clark, the executive director of OPA, "The Ontario Prospectors Association welcomes the government's investment to support junior exploration companies. Junior exploration companies will use this support to help them move their projects to the next level in development." The program's initial round of applications led OPA to commit to supporting 32 exploration projects spanning Northern Ontario.

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Calaveras County's Mystery Cave

by Harry W. Short, Engineering Geologist

A trip to historic Calaveras County, California, is not complete without visiting Moaning Cavern on the western slopes of the Sierra Nevada Mountains at Vallecito. The cavern is accessible north of Sonora through Columbia State Park on Highway 4 from Angeles Camp to Vallecito. Moaning Cavern Road, about two miles south of Vallecito, leads to the cavern entrance atop a steep hillside overlooking Coyote and Wades Creeks.

The first visitor(s) to Moaning Cavern were there about 12,000 years ago. His/her bones, embedded in thick deposits of calcium carbonate, have been found on the floor of the Main Room. Perhaps those persons fell to their deaths through a fracture or joint in the bedrock. Another persistent theory is Indian war parties disposed of enemy bodies by dropping them through a joint in the bedrock. Other rumors allude to a still undiscovered secret passage which allowed easy access to the cavern.

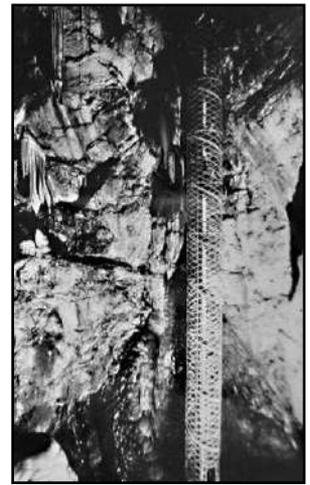
The cavern was named by early explorers who claimed to have heard a "moaning" sound emanating from the cavern entrance. This sound was thought to have been caused by air rushing from the mouth of the cavern, or water dropping to the cavern floor. No one has determined the source of the peculiar sound. Many believe the story was a tale made up by the early explorers, and others think they may have been in a different cavern. Some believe the sound stopped because the acoustics changed after a 100-foot steel staircase [shown in the top photo] was installed.

An underground tour to the bottom of this fabulous vertical cavern takes you millions of years into the geologic past. Sediments deposited in an inland sea near the end of the Late Paleozoic Era became the Calaveras Formation in which Moaning Cavern developed. Geologists have been unable to determine an accurate geologic age for this formation because modification during periods of mountain building apparently eliminated any physical evidence of fossils.

Other interesting features of Moaning Cavern are found below the Main Room. An opening near the Igloo leads to two small rooms - the Mud Flats and Lake Room. The Lake Room contains flowstone (cave deposit formed by flowing water) deposits of calcium carbonate, soda straws, helictites, stalactites, and a small brimstone pool.

Addison Carley spent his life trying to unravel the mystery of the lower rooms reported by Dr. Trask (California's first state geologist) and the French explorers. He never found them.

Did the early explorers really hear a "moaning" sound coming from the cavern? Why was the prominence of the massive Igloo never mentioned by the early cave explorers? Were they in the same cavern? Were human remains dropped into the cavern by marauding tribes or brought in through secret passages? Will the truth ever be found??



About 27 feet high, the Igloo is the largest speleothem in Moaning Cave's Main Room. Photos by Harry Short circa 1965.

Harry

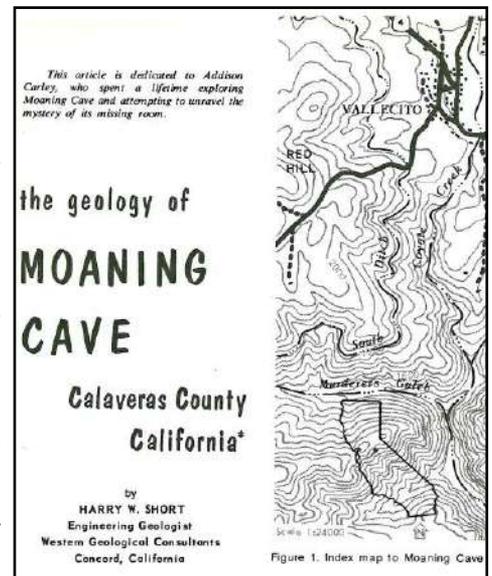
In memory of Harry Short. This will be his last article.
Contact: michele@worldwidedrillingresource.com

Note from Harry's wife Delores: I believe this would have been Harry's favorite article. I found a copy of the paper *California Geology*, published in September 1975, by the State of California, The Resources Agency, Department of Conservation, California Division of Mines and Geology which has an article written by Harry about the Moaning Cave [at right].



Delores Short in caving clothing.

Harry and I spent every weekend during the summer of 1965, while living in Modesto, mapping Moaning Cave. He was working for the Department of Water Resource, State of California, on the California Aqueduct project at the time. I never thought we could sleep on the ground by night and crawl through all those little spaces in that cave by day, although it was mostly dark in the cave except where there were electric lights for the tourists. Of course, we were young and skinny in those days!! It was a wonderful experience and we had a lot of fun and met a lot of interesting spelunkers.



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ORSR# 16122



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ORSR# 16010



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ORSR# 16022

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ORSR# 16006

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Mobile Drill manufactures and supplies a complete line of drill rigs and tooling across a broad spectrum of markets. In addition, we provide short- and long-term rentals, refurbished used drills with OEM warranty, repair, and maintenance for our customer's fleet, and in-house financing on both new and used equipment.

ORSR# 16112

DTH Tools & Service

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Rock-Tech International

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Alvarado TX 76009 USA

(817) 473-0500 Fax: (817) 473-0504

Mobile: (817) 995-8399 or 8699

Contact: Scott Griffin, Judy Herndon,
or David R. Griffin

scott@rocktechintl.com

judy@rocktechintl.com

david@rocktechintl.com

www.rocktechintl.com

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ORSR# 16034

Drilling Tools



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(800) 348-8809

Fax: (219) 324-5962

Contact: Sales
info@diedrichdrill.com
www.diedrichdrill.com

Diedrich Drill manufactures a complete line of auger drill rigs, soil sampling tools, and well supplies. We are a supplier of top quality casing and rock coring products. Our drill rigs range from 3000 ft lbs of torque to over 20,000 ft lbs.

ORSR# 16063

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(708) 667-7892

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Fax: (618) 439-4380

Contact: Todd Taylor
sales@infinitytoolmfg.com
www.infinitytoolmfg.com

Infinity Tool Mfg., a manufacturer of DTH hammer bits, patented bit retention systems, horizontal directional drilling, PDC bits, PDC reamers, culvert cleaning tools, and various drilling accessories. Working through a large dealer network for many of our products, we encourage any distributors interested in our products to contact our sales representatives for further information.

Registered ISO 9001:2008

ORSR# 16076

Floating Subs

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Mobile: (717) 587-2456

Contact: Mark Musante
markmusante@heiseymachine.com
www.heiseymachine.com

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ORSR# 16008

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GRTI
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(940) 872-2222 Fax: (940) 872-3678

Contact: Allan Skouby
askouby@grti.com
www.GRTI.com

GRTI is a leading engineering consulting company specializing in conducting formation thermal conductivity tests for geothermal heat pump applications. Collected data is always analyzed by an engineer, for the mechanical engineer of record. Our services consist of short- and long-term equipment lease or complete test services.

ORSR# 16088

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ORSR# 16080

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(866) 364-9460 Fax: (765) 364-9462

Contact: Jordan Brown
sales@flowcenterproducts.com
www.flowcenterproducts.com

ORSR# 16085

Grout

 **GeoPro, Inc.** (S)

GeoPro, Inc.
PO Box 136
Elkton SD 57026 USA
(877) 580-9348 Fax: (877) 580-9371

Contact: Allan Skouby
askouby@geoproinc.com
www.geoproinc.com

GeoPro, Inc. is the original developer of thermally-enhanced grouting materials designed specifically for the GSHP industry. Our Thermal Grout Lite and Select are the industry benchmarks for quality, consistency, and pumpability. We support our products through design assistance and field sample analysis to verify achieved thermal conductivity performance.

ORSR# 16087

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Contact: Sales
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www.bakerwatersystems.com/monoflex

Baker Water Systems - Monoflex is the leading manufacturer of products for environmental groundwater testing, monitoring, remediation and dewatering, mining, and irrigation applications.

Monoflex has multiple manufacturing facilities strategically located in the United States to provide high-quality products on a timely basis all over the world.

ORSR# 16057

 **GSC** (M)(D)(S)
GEOTHERMAL SUPPLY COMPANY INC.

Geothermal Supply Company
106 Cherry St.
Horse Cave KY 42749 USA
(270) 786-3010 Fax: (270) 786-4136

Contact: David McCool
david@geothermalsupply.com
www.geothermalsupply.com

Geothermal Supply Company provides a wide range of products including polyethylene pipe, prefabricated vaults, and fittings. Our goal is to provide the geothermal industry with quality components necessary for proper geothermal installation and operation. Contact us for innovative solutions and unequalled customer service.

ORSR# 16093

Grout Pumps

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www.rupepumps.com

The Rupe Piston Pump was designed in 1989 by Robert E. Rupe for all types of grout for water well, geothermal, and high-pressure injection for soil remediation. The larger ones are exceptional for mud pumps and high-pressure pumps for tie backs, and (pre-grouting and post-grouting) in the construction industry. Available MP 100-300 pumps, and some parts for MP 200-400 pumps.

ORSR# 16079

Grouters



ChemGrout, Inc. (M)(S)
 (708) 354-7112
 Fax: (708) 354-3881
 805 E. 31st St.
 LaGrange Park IL 60526 USA

Contact: Mike Felder
 sales@chemgrout.com
www.chemgrout.com

With more than 50 years of experience, **ChemGrout®** offers a wide range of standard and custom-built grouting equipment. Our Well Grouter/Geothermal Series continues to provide exceptional productivity, minimal maintenance, and quick paybacks. **ChemGrout's** patented pumps are industry standards offering reliability and durability, along with unique disassembly features that simplify cleanup and maintenance.

ORSR# 16107

Hammers



Center Rock Inc. (M)(S)
 118 Schrock Drive
 PO Box 307
 Berlin PA 15530 USA

(814) 267-7100x112 Fax: (814) 267-6382
 Mobile: (814) 289-3116

Contact: Becky Dorcon
 bdorcon@centerrock.com
www.centerrock.com

Center Rock offers a full line of DTH hammers, from 4" to 20" class for every drilling application, offering options to include our jetted backhead and patented bit retainer system. Our **Center Rock Force™** line accepts QL shank bits while our revolutionary **Rock Xtreme™** class hammers are in a league of their own.

ORSR# 16065



Eastern Driller Mfg. Co., Inc. (M)
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 17512 USA

(800) 233-0173 Fax: (717) 684-2566

Contact: George Brookover II
 sales@edmmfg.com
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ORSR# 16003



Drill King International, LP (M)(S)
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 Mansfield TX 76063 USA

(817) 539-2500 (866) 900-BITS (2487)
 Fax: (682) 222-1050

Contact: Randy Broseh
 Sales@DrillKing.net
www.DrillKing.net

Drill King is an ISO 9001:2008 certified manufacturer of a large range of DTH products for the water well, oil & gas, mining, quarry, civil construction, foundation, geothermal, and exploration industries. Our superior line of products includes DTH hammers, bits, hole openers, PDC bits, surplus tricones, drag bits, and various other tools. We specialize in custom sizes for your specific requirements. We distribute and ship worldwide with quick response and minimal lead times.

ORSR# 16106

Insurance



VolkBell Property & Casualty Insurance (S)
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(970) 223-1804

Contact: Kyle Rehme
 krehme@frig.net
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ORSR# 16035

Logging Equipment



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(303) 279-3211 Fax: (303) 279-2730

Contact: Jim LoCoco
 sales@mountsopris.com
www.mountsopris.com

We manufacture portable, easy-to-use, geophysical loggers for the groundwater and natural resource communities.

ORSR# 16024

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 adam@tandtcarbide.com
www.tandtcarbide.com

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ORSR# 16060

Meters



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 Kansas City Office: (913) 441-0790
 (800) 324-0365 Fax: (763) 478-8043

sales@midamericameter.com
www.midamericameter.com

Mid America Meter, Inc. takes great pride in being able to assist customers by testing, rebuilding, and recalibrating all types of meters from 5/8" to 12" - including positive displacement, turbine, propeller, and mag meters. Our experienced staff services cold and hot water meters, as well as fuel oil meters, molasses meters, seal coating meters, and many more. Offering nationwide services, we have locations in Minneapolis, Minnesota, and Kansas City, Kansas.

ORSR# 16118

Mining Drill Bits



Mobile Drill Intl (M)(S)
Mobile Drill International
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 (317) 787-6371 Fax: (317) 784-5661
 Mobile: (317) 294-6883

sales@mobiledrill.net
www.mobiledrill.net

Mobile Drill manufactures and supplies a complete line of drill rigs and tooling across a broad spectrum of markets. In addition, we provide short- and long-term rentals, refurbished used drills with OEM warranty, repair, and maintenance for our customer's fleet, and in-house financing on both new and used equipment.

ORSR# 16113

Mud Cleaning Shakers



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1753 Atterberry Road
Sequim WA 98382 USA

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Fax: (360) 681-0950

Contact: Jim LaPorte
jim@mudslayermfg.com
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ORSR# 16090

Pipe



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Rockaway NJ 07004
USA

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Fax: (973) 625-4087
Mobile: (973) 715-3867

Contact: Mark Dignazio
mdignazio@endot.com
www.endot.com

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ORSR# 16097



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ORSR# 16089

Packers

Baski, Inc. (M)
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Denver, CO 80232 USA
(303) 789-1200
Fax: (303) 789-0900
Mobile: (303) 748-2767



Contact: Hank Baski
info@baski.com
www.baski.com

Baski, Inc. manufactures standard and custom-built inflatable packers and hydrofracture packers for all applications; and downhole Flow Control Valves™ for Aquifer Storage and Recovery (ASR) projects. **Baski** also produces pitless units, cutthroat flumes, and other products for investigating, controlling, and producing the earth's fluids at this Denver, Colorado-based company.

ORSR# 16056

Pump Hoists



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PO Box 215
Darrouzett TX 79024 USA

(806) 624-2200 Fax: (806) 624-2009

Contact: Robert Duke
sales@pumphoist4u.com
www.pumphoist4u.com

Duke Equipment Company, LLC offers you reliable and versatile pump hoists at an affordable price.

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- We can supply all of your parts needs for your Hunke pump hoist.
- Installation of Cummins engines in Ford F-350 to F-550.

ORSR# 16020



SEMCO, Inc. (M)
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Lamar CO 81052
USA

(719) 336-9006 Fax: (719) 336-2402

Contact: John Sutphin
semcopuphoist@yahoo.com
www.semcooflamar.com

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ORSR# 16083

Pump Parts



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Midland TX 79711 USA

(432) 563-5941 (800) 635-5229
Fax: (888) 519-4345



Contact: Phil Weaver

sales@filmarkproducts.com
www.filmarkproducts.com

Filmark Products, Inc. is a manufacturer of pump parts for fluid end pumps.

ORSR# 16098



QSP Packers, LLC (M)
2316 Inter Ave, Ste D
Puyallup WA 98372 USA

(253) 770-0315
Fax: (253) 770-0327

Contacts: Mark & Ron
info@qsppackers.com
www.qsppackers.com

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ORSR# 16074

Pumps



Robbco Pumps Inc.
12610 N FM 400
Idalou TX 79329 USA

(806) 749-7475 Fax: (806) 892-2922

Contact: Berle Robb
brobb@robbcopumps.com
www.robbcopumps.com

Robbco Pumps is a manufacturer of submersible and line shaft turbine pumps. We are a family-owned and -operated company supplying partial and complete units, both new and repaired, into all types of markets such as agricultural, industrial, municipal, oil, aggregate, mining, etc. At **Robbco**, we are committed to quality products and outstanding service for over 25 years.

ORSR# 16075

Rig Service



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Contact: Fred McAninch

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ORSR# 16037



East West Machinery Exporting, Inc.
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sales@ewdrilling.com

East West Drilling, Inc.
(570) 966-7312
info@ewdrilling.com

Contact: Sales Department
www.ewdrilling.com

We buy & resell most all makes & models of drill rigs, components, tooling, parts, support trucks, air compressors & boosters, mud pumps & systems, engines, generators, and machinery. We have 12 service work bays, wash & paint booths to handle most size jobs for completely rebuilding & customizing machinery & tooling. In business since 1987 and committed to providing high-quality machinery.

ORSR# 16023

Rigs

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ORSR# 16078



Foremost Industries LP
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Contact: Rick Finney
sales@foremost.ca
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ORSR# 16004



Shakti Pumps USA LLC
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Contact: Ashish Rathi
ashish@shaktipumps.com
www.shaktipumps.com

We are the world's fastest growing manufacturing company of submersible pumps and motors. Our product range includes Solar pumps, Booster pumps, and many more. With over 30 years of experience and presence in over 100 countries, **Shakti Pumps** is expanding into the USA by offering opportunities to become an exclusive distributor, dealer, commission agent, or manufacturing rep associate with a TRUE manufacturer, and double your profit.

ORSR# 16007



DRILLMAX, INC.
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(800) 342-0234 Fax: (352) 237-0450
Mobile: (352) 427-7787

Contact: Donnie Wood
donnie@drillmaxrigs.com
www.drillmaxrigs.com

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ORSR# 16067



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Contact: Cris A. Collins
guspech@guspech.com
www.guspech.com

Manufacturer of earth-drilling equipment, bucket, core, and rotary/auger drilling rigs used for water/dewatering wells, elevator jack, oilfield conductor holes, hazardous waste, recovery, exploration, soil testing, coring, sampling, monitoring, cathodic, angle, geothermal, and roto-sonic. Torques from 2500 to 41,000 ft lbs, pullback up to 40,000.

ORSR# 16029

Rigs

Higgins Rig Co. (S)

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Fax: (270) 325-3405



**Higgins
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Contact: Craig "Higgy" Higgins

higgy@higrig.com www.higrig.com

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ORSR# 16030



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ORSR# 16014

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(580) 234-5971
Fax: (580) 234-5980



Contact: Melissa L'Espoir Atwood
melissa@eniddrill.com www.eniddrill.com

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ORSR# 16031

Rock Drilling Tools



Mitsubishi Materials USA Corporation (M)

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Contact: Customer Service
rock@mmus.com
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ORSR# 16091

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Contact: Steve Warren
swarren@throoprockbit.com
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Headquartered in Tonkawa, Oklahoma, USA, **Throop Rock Bit** designs, manufactures, and assembles all of its products in house, using state-of-the-art technology, materials, and equipment. **TRB** has been serving the drilling industry for over 50 years, providing quality products, superior workmanship, reliable delivery time, and excellent customer service. Our goal is to always serve our customers with unmistakable quality and unmatched service!

ORSR# 16038



MARL Technologies
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Littleton CO 80120
USA

(800) 404-4463 Mobile: (720) 822-2293

Contact: Stuart Lyle
slyle@marltechnologies.com
www.marltechnologies.com

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ORSR# 16103



Sonic Drill Corporation (M)

119 N Commercial St., Ste. 190 #120
Bellingham WA 98225 USA

(604) 588-6081

Contact: Bill Fitzgerald
info@sonicdrilling.com
www.sonicdrilling.com
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With four awards for its innovative patented technology, **Sonic Drill Corporation** is the world leader in the design and manufacture of robust sonic drill rigs and drill tooling. Building on more than 30 years of research and development, Sonic drill rigs have earned the reputation of being 3-5 times faster (depending on soil conditions), proving their worth on numerous projects around the world.

ORSR# 16039



Mobile Drill Intl (M)(S)

Mobile Drill International

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Indianapolis IN 46227 USA
(317) 787-6371 Fax: (317) 784-5661
Mobile: (317) 294-6883

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ORSR# 16114



Sun Machinery (S)

PO Box 482
Oceanside NY 11572 USA
(516) 536-7375 Fax: (516) 536-7317
rigs@sunmachinery.com
www.sunmachinery.com

Sun Machinery is the place for contractors to buy and sell rigs. Our database contains thousands of used rigs, which are presented and continuously updated online, linking old mechanical methods to the modern digital age. **Sun** specializes in rigs for foundation drilling, mining, water well, oil field, construction, mineral exploration, environmental, quarry, geothermal, and support equipment such as compressors, boosters, mud pumps, power swivels, drill pipe, hammers, and bits.

ORSR# 16077

Silica Sands



Premier Silica LLC
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salesinfo@premiersilica.com
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ORSR# 16053

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ORSR# 16115



SonicSampDrill
9230 Globe Center Drive, Ste 110
Morrisville NC 27560 USA

Contact: Jay Boland
j.boland@eijkelkamp.com
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ORSR# 16123



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ORSR# 16116

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ORSR# 16117

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ORSR# 16051



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ORSR# 16012



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Contact: Judson E. Walls
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ORSR# 16101



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ORSR# 16001



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ORSR# 16025



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Contact: Nick Farrara
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ORSR# 16071

Well Caps



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ORSR# 16026



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Contact: Hope Royer
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ORSR# 16049

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dennis@merrillmfg.com
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ORSR# 16028

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ORSR# 16104



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ORSR# 16124

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ORSR# 16127

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Oil/Water Exploration

by Harold White

It is cold and snowing in some of the hills and mountain areas in Oregon. It looks like another cold winter coming to the north country, so I will be looking for something to do in a warmer place or country. However, we are still busy here drilling and doing locations - finding places for people to drill into underground creeks and rivers.

With this technology, we can find creeks and rivers in any country or place, no matter the elevation. One well we drilled recently at 4600 feet elevation was less than 200 feet deep and test pumped at 2350 gallons per minute (gpm) - maximum for the test pump. Further tests reported the well would sustain or hold constant at 5000 gpm. The point is, we can find underground creeks and rivers and we can find them at any elevation in any drought area like California's five-year drought area. There are a lot of creeks and rivers flowing through that area.

If you are interested in the value of water and how it is being controlled, sold, and transported, you might want to look up an article I saw recently. It was about Roseburg Forest Products lumber company in Weed, California, near Mt. Shasta. The company had been charging the city for water for 50 years at \$1 per year. In July, it began charging \$97,500 annually, then told the city to look for another source since they would no longer supply it. Roseburg already sells water to Crystal Geysers Alpine Spring, who bottles and ships it.

Coincidentally, my *WDR* magazine is open next to where I am writing. The picture has a drilling rig with tower up, a guy is walking away, and a dog is looking at him. On the collar, I can read "Water Right". Up at the top of the page is *The "Idiots" Corner* by "Billy Bob Smith". What is the answer, Billy Bob?

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 WDR.

Harold

Harold White may be contacted via e-mail to michele@worldwidedrillingresource.com



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Tyson from Thomas Drilling, Inc. of Afton, Wyoming, was proud to show his Schramm rig with Vadim and Tim of Schramm, Inc. of West Chester, Pennsylvania, at the recent MINExpo.

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Another key area where many contractors require a full range of equipment options is in hydrant selection, due to significant variations in local climate, codes, and other factors. Improvements in domestic water well devices are occurring here as well.

"To meet current Michigan code, we needed state-approved hydrants that do not drain back because these are no longer accepted," explained Chuck Garvie, a project manager at Brad Malley Well Drilling, a Michigan-based well drilling contractor and pump installer.

Garvie selected a removable, sanitary yard hydrant called the Hide-Drant® by Merrill. "The Hide-Drant meets Michigan state, municipal, and residential code. It is easy to install with no need for a double check backflow preventer or secondary line to be run with it. With a riser made of steel and a stainless steel connection, we have had virtually no callbacks. I installed one in my home and it still works well after 12 years, with no problems."



The steel no-lead Hide-Drant® is approved for use in some of the most restrictive states in the U.S., including Illinois, Indiana, Michigan, Ohio, and Wisconsin.

Since the hydrant's insides are removable, users can easily connect one to the closest installed base for safe, convenient placement. "At wells for RVs, campsites, or cabins, when people leave in the fall they can remove it to avoid freeze risk," stated Garvie.

For colder climates where all-year access to well water is required, additional innovations are available. Nick Nawcewicz, a plumber at D&D Mechanical in North Dakota, has enjoyed success with the Any Temp® Heated Hydrant. This device provides frost proof water service with a self-regulating heating cable which keeps water flowing and drains itself below the frost line when shut off.

While some electric-powered heating cables in the industry are submerged below the water line and not grounded, the device's heating cables are grounded and not placed under the water line. "We have found that the Any Temp Heated Hydrant succeeds anywhere heated well water is needed year-round,"

said Nawcewicz. "The heated cables are kept dry outside of the pipe, so they are easy to install, replace, and do not

The Any Temp® Heated Hydrant is often installed in mobile and manufactured homes, as well as livestock waterers in cold regions.



have to be dug up. They are grounded and essentially trouble free. I have never had one trip out from ground faults."

For contractors needing to cost-effectively meet well codes and stay competitive, having access to a wider range of well equipment and accessories can further streamline their installation process. Paying attention to some of the smaller details in system design and product selection can help to optimize quality as well.

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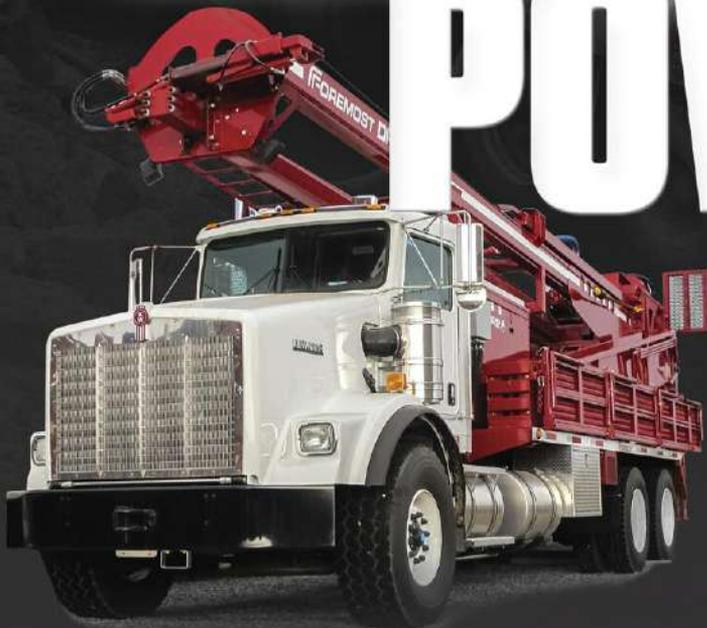
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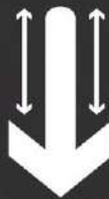


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WVU photo of the Marcellus Shale Energy and Environmental Laboratory by Brian Persinger.

Is Drilling Waste Safe to be on Highways?

Adapted from a Press Release
by West Virginia University

Researchers at WVU (West Virginia University) have been studying drilling waste produced at two research wells near Morgantown, West Virginia. What they discovered is the waste is well below federal guidelines for radioactive or hazardous waste.

Dr. Ziemkiewicz, director of the West Virginia Water Research Institute at WVU, and his research team are studying the solid and liquid drilling wastes generated during shale gas development, including drill cuttings, muds, and produced water.

Drilling a horizontal directional well in the Marcellus Shale Formation typically produces about 500 tons of rock fragments, or cuttings. WVU

researchers have been studying drill cuttings for radioactivity and toxicity. Scientists with the Marcellus Shale Energy and Environmental Laboratory (MSEEL) were able to show using a “green” drilling mud - BioBase 365 - at the well site resulted in all 12 cuttings samples passing the U.S. Environmental Protection Agency’s test for leaching toxicity, allowing them to be classified as nonhazardous for nonradiological parameters like benzene and arsenic.

They also determined drilling mud had a strong influence over the environmental risks associated with handling and disposing of drill cuttings. According to Ziemkiewicz, the U.S. Department of Transportation classifies solid wastes exceeding 2000 pico curies per gram (pCi/g) as low-level radioactive waste requiring special permitting and handling.

“Radium is the dominant radioactive element in drilling wastes. In our study, the highest radium readings were below 10.8 pCi/g in the horizontal legs of the two production wells at the MSEEL site. Most were below 5 pCi/g,” he stated. “The highest radium level in produced water found so far was 17 pCi/g. All of these are well below the U.S. Department of Transportation standard.”

Ziemkiewicz’s team also sampled waste streams at the two production wells to identify changes in organic, inorganic, and radiochemical composition over time. Among these findings, they noted almost all contaminants increase through the production phase of an unconventional gas well, while the volume of water drops rapidly. Since the toxic concentrations far exceed permissible levels for drinking water or discharge to streams, most of this water is used for subsequent hydraulic fracturing operations.

The MSEEL project is led by WVU and the Ohio State University (OSU) in partnership with Northeast Natural Energy, Schlumberger, and the National Energy Technology Laboratory of the United States Department of Energy (USDOE). It is the first long-term, comprehensive field study of shale gas resources in which scientists will study the process from beginning to end.

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In Memoriam

David M. Gleason

With great sadness, Austin Powder Company announced the passing of President and CEO David M. Gleason on October 17, 2016.

After graduating from Dartmouth College in 1954, he began his career as a technical representative at Austin Powder in 1955. From there, he worked his way through the ranks from sales representative to director of sales, vice president and general manager, and ultimately in 1965, to president and chief executive officer. He was instrumental in expanding the business from a small regional company to a worldwide manufacturing/marketing organization, operating in North America, South America, Europe, Asia, and the Middle East.

Mr. Gleason held memberships in a multitude of business associations, including the International Society of Explosives Engineers, American Mining Congress, American Institute of Mining, Metallurgical and Petroleum Engineers, and the Society for Mining, Metallurgy and Exploration. A lifelong Clevelander, he was involved in many local civic organizations.

He is survived by his wife of 65 years, Kathryn; son Michael (Connie), Timothy (Betsy), Alexander "Sandy"; daughter Colleen; and eight grandchildren.

The management and staff of *WWD&R* extend their condolences to David's family, friends, and colleagues.

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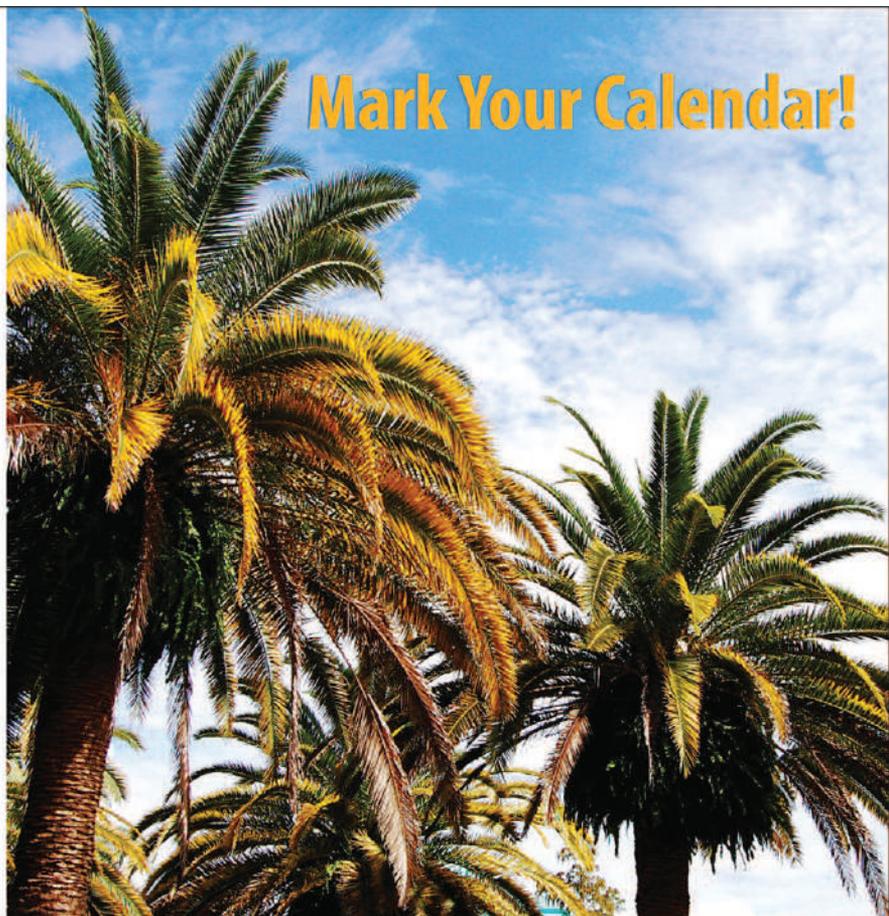
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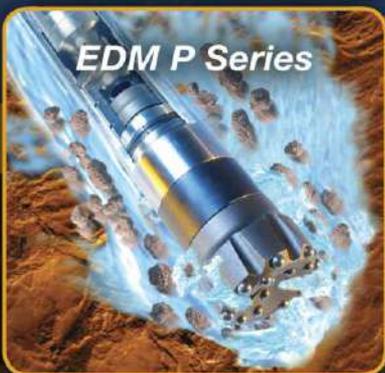
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Atlantic Coast Pipeline Under Contract

Adapted from Information by Dominion

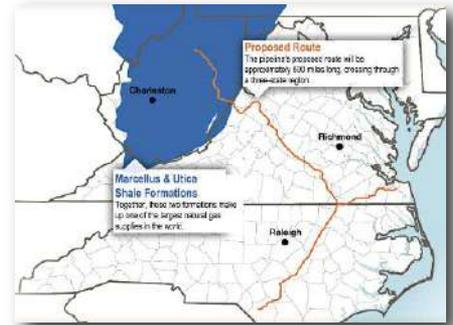
Atlantic Coast Pipeline, LLC, which has proposed a nearly 600-mile natural gas transmission pipeline to bring energy to Virginia and North Carolina, announced it has signed a construction contract with Spring Ridge Constructors, LLC (SRC), a joint venture of leading natural gas pipeline construction companies.

Pending approval by the Federal Energy Regulatory Commission (FERC), the Atlantic Coast Pipeline (ACP) would run from Harrison County, West Virginia, southeast through Virginia with a lateral extension to Chesapeake, Virginia, and then south through eastern North Carolina. If approved, construction is scheduled to begin fall of 2017. According to economic impact studies conducted in 2015, the project's construction is expected to generate more than 17,000 jobs, \$2.7 billion in total economic activity, and \$4.2 million in average annual tax revenue for cities and counties in the project area.

"We are excited to work with SRC, which has assembled four of the nation's leading and most-qualified pipeline builders for this project," said Diane Leopold, president of Dominion Energy.

In another significant milestone for the project, in early August FERC issued a Notice of Schedule, which established the timeline for the remainder of the project's federal environmental review process. ACP anticipates completing construction and bringing the pipeline into service in late 2019. ACP is working with its contractors to evaluate the possibility of bringing on more crews and working on more simultaneous spreads to complete construction sooner. This analysis is expected to be finalized over the next few months.

Atlantic Coast Pipeline, LLC is composed of four major U.S. energy companies - Dominion, Duke Energy, Piedmont Natural Gas, and Southern Company Gas.

An advertisement for the IGSHPA Conference & Expo. The main headline is "DIG IN" where the letters are made of soil. Below it, the text reads "IGSHPA Conference & Expo | March 14-16, 2017 | Denver, CO". A collage of images shows people at the conference, a presentation, and a city skyline. The bottom section has a dark blue background with the text "DIG IN to reach the next level" and a paragraph: "This year, we're changing things up. With a new start day, expanded breakout session slots, and dedicated expo hours, you're sure to find all you need to DIG IN to the ground source heat pump industry. We're focusing this year's conference and expo on providing you with the tools and information you need to take your geothermal business to the next level. And we've invited friends of the industry to join us in the exhibit hall, so you're bound to see some new faces that can help support your work." The IGSHPA logo is on the right. At the bottom, it says "To learn more or register visit igshpaconference.com".

Geotechnical Investigation cont'd from page 22.

assistant for a geotechnical engineering firm and eventually became a licensed professional geologist.

Once the samples are collected, they will be transferred to Arkansas Analytical, an independent Arkansas-certified environmental laboratory. Quality criteria have been set to assure the integrity of the samples. Once the validated laboratory results and analyses are completed, a final findings report will be submitted to ADEQ by January 2017.



Wyo-Ben's Greg Sweetser (R) accepting the award.

Wyo-Ben Wins Reclamation Award

Adapted from a News Release by Wyo-Ben, Inc.

Bentonite producer Wyo-Ben, Inc. has won the 2016 Kenes C. Bowling National Mine Reclamation Award in the noncoal category for pit 138L in Wyoming. Sponsored by the Interstate Mining Compact Commission (IMCC), the award is named after the late charter executive director of IMCC, and recognizes outstanding achievements in reclamation and promote reclamation on a national level. Each year there are two awards presented: one for coal and another for noncoal minerals.

As a common reclamation practice, Wyo-Ben contours overburden to match the surrounding topography during its reclamation process. This resulted in varied topography creating microenvironments which aid in the establishment of desired native vegetation, provision of habitat for wildlife using the area, a more aesthetically appealing landscape for recreational visitors, and allows for the formation of stable, meandering reclaimed drainages which tie into native drainages. When deep drainages occurred in a mining area, even though it would be more economical to mine through them instead of stopping the mining process and starting again on the other side, Wyo-Ben chose to take the more expensive route of avoiding the drainages for ecological purposes.

Using the castback mining technique, Wyo-Ben was able to reestablish several native perennial forbs and shrubs using residential soil seed. The company routinely separates topsoil from the subsoil of poorer quality relative to vegetation establishment. Subsoil, and when available other deeper growth mediums, are spread first on contoured overburden in preparation for seeding. The topsoil is then spread on top to prepare the best possible environment for establishing vegetation. This practice, when combined with other techniques, led to the successful establishment of vegetation and resulted in excellent vegetation cover at the reclaimed pit.

Lands were seeded each fall, and occasionally in the early spring, with a mostly native seed mix containing a variety of grasses and shrubs. Seeding was completed using a Pitter-Broadcast seeder which produces a series of one foot by one foot pits into which seed is broadcast. This method results in microenvironments being created which provide many benefits to seed germination and vegetation establishment. Each pit is a small water collection area providing more water to the seed in the pit than if they were sitting on a flat seedbed. This is a great advantage in the arid environment. The configuration of the pit also acted as a soil trap, collecting wind-blown soil from the air and depositing it on seeds, providing cover. The water holding capacity of the pits reduces soil erosion from water runoff.

Additionally, Wyo-Ben reduces its disturbance footprint by using information gathered while doing exploration drilling to determine whether the bentonite in a particular area meets its quality standards before deciding to mine it. This allows the company to avoid unnecessary mining. These undisturbed areas provide a source of native seeds used to reclaim the surrounding areas and also helps stabilize reclaimed lands. The result of these practices is reclaimed land supporting the premined land uses of wildlife habitat and livestock grazing.

The combination of practices used by Wyo-Ben for reclamation can be utilized by other mining companies in areas where climatic conditions create challenges to successful mine reclamation.



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Those aspects? **Safety. Efficiency. Profitability.**

SAFETY. It's safer because it requires far less tool handling.

Tool handling has a direct correlation to safety. The more tooling is handled the more likely an injury may occur. The weighted wireline (WWL) system eliminates the need to trip rods in and out of the cased hole.

EFFICIENCY. It's more efficient because it's faster than all other methods. When using the WWL, the sample barrel and weight assembly are tripped in and out together with only the use of the winch, so the speed and efficiency of the system becomes more and more evident the deeper you go. Geoprobe® engineers completed a time study on trip in and trip out times (right). Mike Carlin, Geoprobe® Tools Group Leader, says check the numbers regarding efficiency. **"The use of the winch with WWL significantly reduces the time to trip samplers and core barrels in and out of the casing,"** he said. **"The numbers don't lie!"**

"I'm turning 58 years old and I can run our 8150LS sonic all day long! It's easy on me. And I love that the weighted wireline system takes care of the physical aspect and safety concerns."

Robert Keyes • President
Associated Environmental Industries • Norman, OK

PROFITABILITY. It increases profitability because it requires few parts to operate. Overall efficiency correlates nicely to profitability. So does a clean safety record. But the overall cost to tool up for and maintain a weighted wireline system is quite low compared to conventional systems such as 4x6 since it requires so few parts.

Both weighted wireline systems ... SDT45 and SDT60 (for 4.5- and 6.0-in. casing) ... are simple to use. Jed Davis, Tools Engineer, said, **"During a customer training session, it only took one core run for the drill crew to understand the weighted wireline system, and just a few more runs to have it completely mastered. We didn't hit a home run this time; we think it was a grand slam!!"**

Mike also said the weighted wireline system is not meant to replace conventional 4x6 or dual tube systems. "It has always been our recommendation that weighted wireline systems complement these other soil sampling systems," he said. "We don't suggest going to the field with one tool in your tool box, nor do we recommend that you limit yourself to one sampling system." There are formations where 4x6 works great. The same can be said for dual tube systems, **"But when you can incorporate a weighted wireline system into your project,"** Mike added, **"the benefits far outweigh any costs.** You can spend all day taking the back roads to Grandma's house, but why bother when the interstate will get you there twice as fast."

Probing Times articles on Geoprobe® Sonic Weighted Wireline are available at:
www.geoprobe.com/pt-spring2015 and www.geoprobe.com/pt-fall2015.



Rock core recovered using SDT60 Weighted Wireline Tooling.

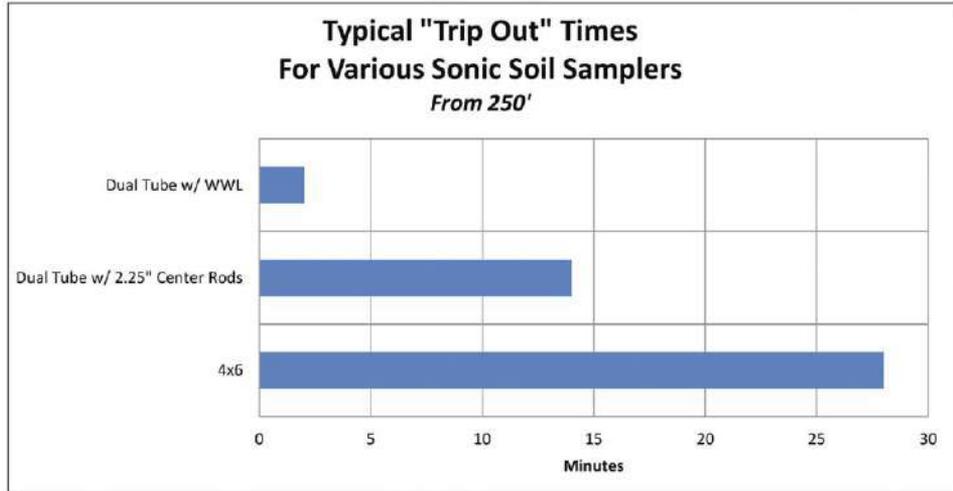


Sonic soil cores are examined in the field by an onsite geologist. The cores were retrieved by running SDT60 and an 8150LS.



Running sonic weighted wireline with SDT45 tooling. (above) Modular weight assembly, with the overshoot 'spear' visible inside the weight head prior to being lowered downhole. The modular weight assembly consists of two, 150-lb. weight segments coupled together and a threaded head and overshoot spear.

— Faster Tripping Times —



High-quality soil samples in less time! This graph was created by analyzing thousands of feet of various sonic drilling data collected by Geoprobe® engineers. At deeper depths, simple math indicates how much faster the sonic dual tube weighted wireline system can be.



An 8150LS Rotary Sonic, owned by Associated Environmental Industries in Norman, OK is running SDT60 and a 6.0-in. Weighted Wireline system.

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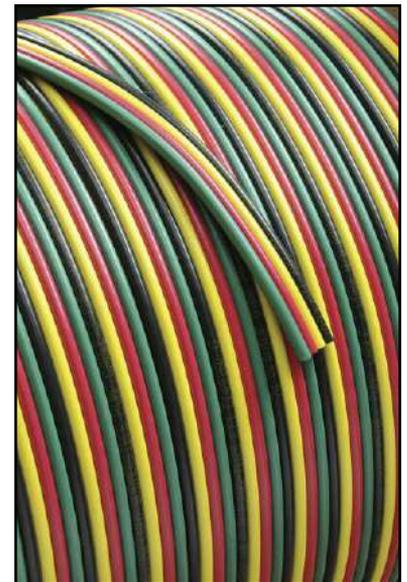
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The company also offers On Demand Cable Service, which includes manufacturing inventory on master reels. This unique service gives customers product availability for the duration of the project, delivered at the time of installation, ultimately lowering the cost of ownership by reducing on-site warehousing and labor costs, minimizing the possibility of jobsite damage or theft, and eliminating scrap.

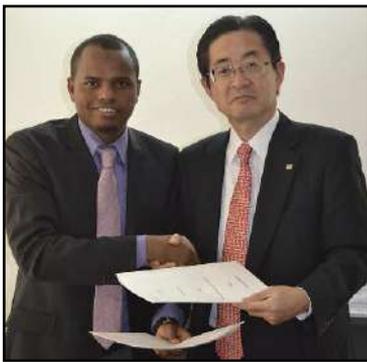
The company's cable management program includes:

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- Customer specified reel sizes and tagging.

Service Wire is also a member of the National Ground Water Association and the National Association of Electrical Distributors. The knowledgeable Service Wire Team is committed to manufacturing quality products, providing prompt delivery, and ensuring customers are completely satisfied.

Q. How much of the world's water is trapped in glaciers?

A. 68.7%



Dr. Kayad Moussa Ahmed and Mr. Toyoaki Fujita signed the memorandum of understanding.

Toshiba to Help Djibouti with Geothermal Development

Adapted from a Press Release by Toshiba Corporation

Toshiba Corporation has concluded a memorandum of understanding (MOU) with the Office Djiboutien de Développement de l'Energie Géothermique (ODDEG), the government organization responsible for developing the country's geothermal power capabilities. Under the terms of the MOU, ODDEG and Toshiba will promote

Djibouti's extensive geothermal resources and provide training for those working in the plants.

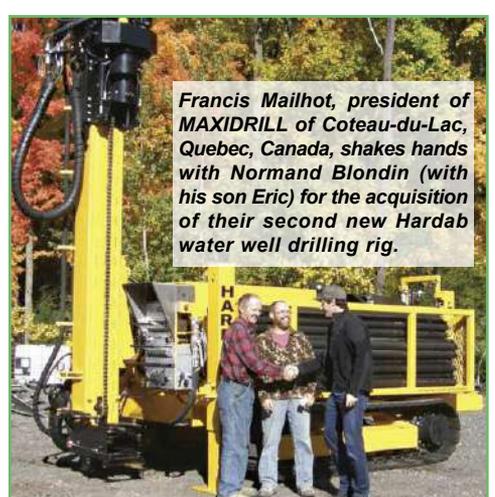
ODDEG was established in 2014 and reports directly to the president of Djibouti, in addition to being responsible for the long-term geothermal resource development. Working with Toshiba will allow ODDEG to draw on Toshiba's capabilities as one of the world's largest providers of geothermal energy equipment. The company will also assist with the creation of guidelines for plant operation and management, the development and supply of generation systems, and support in training personnel to operate plants.

Djibouti currently has an installed generation capacity of 120 megawatts, mostly from thermal power, and has to supplement this with power imports from Ethiopia. However, many sites in Djibouti are suitable for geothermal power generation, and current plans include constructing geothermal power stations with a base capacity of about 50 megawatts.

Since delivering Japan's first geothermal steam turbines and generators in 1966, Toshiba has advanced its geothermal power generation business. The company has delivered 53 geothermal turbines, with a total capacity of 3400 megawatts, to plants in the USA, the Philippines, Iceland, and other countries around the world. This represents approximately 23%, of the world's installed geothermal capacity, making Toshiba the world's top supplier.



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For more information, contact Dave Schulenberg
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Through the Front Door!

by Jim Kuebelbeck

Pigeons Part 2

Every minute of my free time during the next two weeks was spent building a chicken wire enclosure high up in the barn behind one of the previously sealed cut-out openings. To my surprise, even my dad said I had done a good construction job. Some days later during school recess I ran over to "pigeon king" with my two dollars and a big burlap sack I had taken from Dad's granary. He told me he would catch a few of them, and I could pick them up the next evening. I was overjoyed. From the smile on his face he seemed

to be about as happy as I was. I didn't learn the real reason for his smile until about six weeks later. (Unbeknownst to me, he and my dad had been in collusion behind the scenes about teaching this young super smart boy a lesson in life.)

My dad offered to pick me up after school the next afternoon and bring my newly purchased treasures back to our farm. I almost couldn't wait to get home to see what the bulging, wiggling burlap sack contained. With my dad's help, we hoisted up the sack of pigeons and released them into their newly constructed home.

Among the six beautifully colored pigeons dumped out of the sack was the nicest speckled colored one I had often seen flying around our school in town. What a great day!

The days which followed were spent keeping them well fed and supplied with freshwater. After about a week of keeping the floor clean every day, I realized some of my dad's previous words about "pigeons being dirty" might have some merit after all! But I was determined to show my dad my "pigeon research" would prove to him I knew what I was doing! After about two weeks, those pigeons had become so accustomed to their new home, I had them actually eating out of my hand when I fed them. How great was that?!

I then decided I would "condition" them for one more week and then release them to their new surroundings on our dairy farm. I decided to choose a Saturday morning for the great release, so I could personally witness the spectacle of their first flights of freedom around their new home. After doing my chores, I opened the small door on the outside of the barn and quickly ran outside to watch their exit to freedom. It took a few minutes for them to realize there was a new opening to their cage, but one by one they all flew out to look over their new world. They flew all around our farmyard a number of times in ever widening circles (seeming to get their bearings) and it was indeed a sight to behold. They flew over the barn, the house, the windmill, and over the grove. I had succeeded! My plan worked! I was amazed at my accomplishment. What happened next, however, was more than demoralizing. The last I saw of those pigeons was their tail feathers as they immediately headed back to their original place of birth in town!

I never said a word to my dad at the time, but the next day he noticed the cage was empty and asked if the pigeons had somehow escaped. He wasn't exactly smiling, but I'm sure he knew what had happened. There was nothing smart I could say, so I simply told him I let them out and the darn things flew away. Adding insult to injury, the next day at school recess I saw that speckled pigeon once again flying gracefully over the schoolyard! Another life lesson learned, thanks to my late father.

*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**.*

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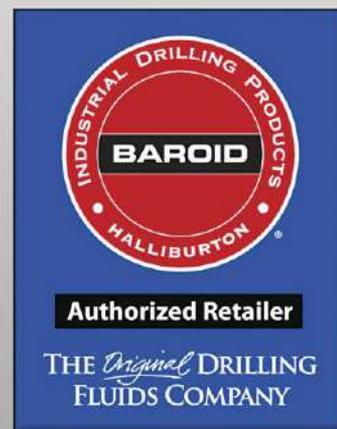
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Mancos Shale Redefines its Worth in New Assessment

Adapted from Information Provided by U.S. Geological Survey

The U.S. Geological Survey (USGS) recently conducted the second-largest assessment ever of potential shale and tight gas resources in Colorado. The Mancos Shale Formation, located in Colorado's Piceance Basin, is purported to contain approximately 66 trillion cubic feet of shale natural gas, 74 million barrels of shale oil, and 45 million barrels of natural gas liquids. This is an update to a prior assessment completed in 2003, which only estimated about 1.6 trillion cubic feet of shale natural gas.

"We reassessed the Mancos Shale in the Piceance Basin as part of a broader effort to reassess priority onshore U.S. continuous oil and gas accumulations," said Sarah Hawkins, USGS scientist, and lead author of the report. "In the last decade, new drilling in the Mancos Shale provided additional geologic data and required a revision of our previous assessment of technically recoverable, undiscovered oil and gas."



Sarah Hawkins examines a core drilled by the USGS Core Research Center.



USGS scientists drill a test core for the report.

Within the Mancos Shale, more than 2000 wells were drilled and completed since the previous assessment. Over 4000 feet thick, the Mancos Shale contains intervals acting as the source rock for shale gas and oil - meaning petroleum was generated in the formation. Conventional reservoirs both above and below the formation, as well as tight reservoirs within the Mancos, have been primed with oil and gas, which migrated out of the source rock. Oil and gas have also remained in the Mancos' continuous shale gas and shale oil reservoirs. Tight gas in the younger, more shallow areas of the Mancos Shale is produced chiefly from vertical and directional wells, in

which the reservoirs have been hydraulically fractured. Shale oil and gas in the older, deeper sections are produced primarily from horizontal wells also hydraulically fractured. The USGS Energy Resources Program also got involved, drilling a research well in the southern Piceance Basin which provided meaningful new geologic and geochemical data used to refine the 2003 assessment.

Shale oil and gas in the older, deeper sections are produced primarily from horizontal wells also hydraulically fractured. The USGS Energy Resources Program also got involved, drilling a research well in the southern Piceance Basin which provided meaningful new geologic and geochemical data used to refine the 2003 assessment.

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So we continued on drilling. When it came time to fall into the old flume, all of the geologists and helpers from the mine came down in their trucks to watch. The mine superintendent even drove his car to watch - I think it was a Cadillac - and parked close to the rig. I marked the kelly based on all of our measurements, where we should go into the old mine workings. After going less than a foot, we went into the mine. All the guys started blowing the horns on their pickups, they were so happy we hit it. I shut off the rig. The mine superintendent got out of his car and came over. He said, "You got lucky, didn't you?"

Well that made me mad. I'm from Louisiana, you know, and I didn't like being told something like that. We put a lot of effort into that hole! When the other observers gave him a look after his remark, he reached out to shake my hand saying, "Well, I think you did a damn good job, Mr. Beatty."

I replied, "Thank you. I appreciate that."

The next time the job came up for bid, they had changed mine superintendents to one who knew us a little better, and we got the job. I think it was about five years of us working, before they even put it up for grabs again, for new bids. So our efforts had paid off and everyone was happy. I was plumb tickled to death. You know, it makes a guy really feel good when he can come up with a plan like that, which worked good except for the quartzite business.

Art

Art Beatty may be contacted via e-mail to michele@worldwidedrillingresource.com

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Need a Boost? Try a Little Bite of Sunshine

Compiled by **Bonnie Love, Editor,**
WorldWide Drilling Resource®

Just about everyone has heard the saying “an apple a day keeps the doctor away,” but apples aren’t the only fruit with amazing health benefits.

The history of oranges is pretty interesting. The popular fruit was first grown in southeast Asia, northeastern India, and southern China around 2500 B.C. Spanish explorer Juan Ponce de Leon planted America’s first orange trees in St. Augustine, Florida, in 1513. Florida produces about 70% of the total U.S. crop of oranges and 90% of those oranges are used to make juice.

In Los Angeles, California, the orange tree was first planted by William Wolfskill in 1841. He was one of the earliest settlers of Los Angeles. He not only planted orange trees, but also sold oranges to gold rush miners.

Today, Brazil, is the leading producer of oranges, accounting for about one third of the world's total production of oranges. Although oranges are known for high concentrations of vitamin C, they have numerous health benefits.

🍊 Oranges are rich in citrus limonoids, proven to help fight a number of varieties of cancer including esophageal, mouth, skin, lung, breast, stomach, and colon.

🍊 Drinking orange juice regularly prevents kidney diseases and reduces the risk of kidney stones. However, the high sugar content of fruit juices can cause tooth decay and the high acid content can wear away enamel if consumed in excess.

🍊 Since they’re full of soluble fiber, oranges are helpful in lowering cholesterol, as well as relieving constipation.

🍊 Oranges are full of potassium, an electrolyte mineral, responsible for helping the heart function well. When potassium levels get too low, you may develop an abnormal heart rhythm, known as an arrhythmia.

🍊 Studies show the abundance of polyphenols in oranges also protects against viral infections.

🍊 Oranges can also be beneficial to the health of your eyes as they are rich in carotenoid compounds which is converted to vitamin A, helping to prevent macular degeneration.

🍊 The flavonoid hesperidin found in oranges helps regulate high blood pressure, and the magnesium in oranges helps maintain blood pressure.

🍊 Oranges are full of beta-carotene, a powerful antioxidant protecting cells from damage, which also protects the skin from free radicals and prevents the signs of aging.

🍊 Oranges, like all fruits, have simple sugars in them, but the orange has a glycemic index of 40. Anything under 55 is considered low. This means as long as you don’t eat a lot of oranges at one time, they won’t spike your blood sugar and cause problems with insulin or weight gain.

🍊 New research published in the *American Journal of Clinical Nutrition* implied enjoying a daily glass of freshly squeezed orange juice can significantly lower your risk of developing rheumatoid arthritis.

🍊 There is also evidence of positive effects associated with citrus consumption in studies for arthritis, asthma, Alzheimer's disease and cognitive impairment, Parkinson's disease, gallstones, multiple sclerosis, cholera, gingivitis, optimal lung function, cataracts, ulcerative colitis, and Crohn's disease.

🍊 An orange has over 170 different phytonutrients and more than 60 flavonoids, many of which have been shown to have anti-inflammatory, and blood clot inhibiting properties, as well as strong antioxidant effects.

So why not take a few extra minutes to peel open a fresh orange, or pour a glass of cold orange juice for a quick burst of energy? Power up with one of nature’s super fruits - the orange!



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NDA Announces 2015 Safety Award Winners

Adapted from a Press Release by the National Drilling Association



The National Drilling Association (NDA) is proud to announce the winners of its 2015 Safety Awards which were recently presented at the 2016 National Drilling Association Annual Convention in Pittsburgh, Pennsylvania. Members competed based on their 2015 safety record. Winners were required to have excellent safety records that were above the average of their competitors.

The 2015 NDA Safety Award was presented to the following NDA members:

Category: 10,000 - 250,000 Annual Exposure Hours

- Earth Matters, Inc.
- Frontz Drilling Company
- Gregory Drilling
- McCray Drilling

Category: 250,001 - 500,000 Annual Exposure Hours

- Southern Earth Sciences, Inc.



NDA President Mike Willey with Danny Hines of Southern Earth Sciences.



NDA Safety Committee Chair Chuck Valenta with Stephen Wright of Frontz Drilling.



NDA Safety Committee Chair Chuck Valenta with Mike Willey of Earth Matters.

Safety is a top priority for members of the NDA, and these winners have set a fine example for all companies in the drilling industry.

To aid in achieving the level of zero accidents which all its members aspire to reach, NDA offers safety materials such as Tailgate Safety Tips, a Drilling Safety Guide, and Safety Label kits. These safety aids are available to any company wishing to improve safety among employees.

Safety material order information and NDA membership information can be found online at www.nda4u.com.




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choices, and often it's the choice that's the most frightening that brings the greatest reward. Conversely, getting mired in uncertainty will curtail luck faster than anything."

Another pattern I observed from some of the very luckiest people I spoke with is they are bold enough to go after what they want, and frequently get it. Written as an equation: Desire + Action = Luck. People who believe they are lucky expect to win, so they are more likely to enter a contest, and buy a lottery or raffle ticket. A statistician might counter it is because they enter so often, their odds of winning are increased.

Several respondents told me luck is what you make of it. Turning lemons into lemonade.

Some reported having a brief spell of luck. Julia Hobbs, founder of Project Free Hand in Wales, experienced a year of luck in 2007. Wherever she went she would find money on the street. Adding to the fascination of this story is Michelle Gregg, a counseling astrologer in Atlanta, who explained to me, "Folks who are in the midst of a Jupiter transit tend to have good luck, receive money, etc. for the period of time that the transit is active."

The conclusion I draw from all the people I've interviewed is: those who believe they are lucky are willing to take more risks than the average person. This willingness seems to open more opportunities for success. If you want luck to come your way, then put yourself in its path.

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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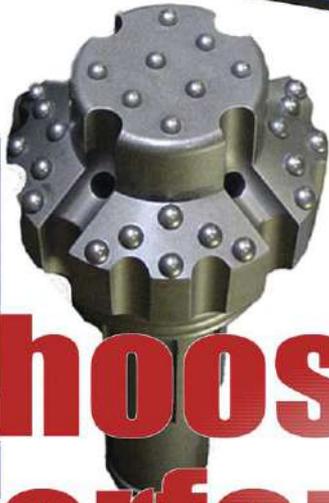
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2016 Proved to be the Safest Year in Mining History

Adapted from a News Release by the Mine Safety and Health Administration

According to the latest data from the U.S. Department of Labor's Mine Safety and Health Administration (MSHA), Fiscal Year (FY) 2016 was the safest year in mining history. The country's more than 13,000 mines recorded a record low of 24 fatalities between October 1, 2015, and September 30, 2016.

"These numbers represent nearly a 30% drop since FY 2013," said Assistant Secretary of Labor Joseph A. Main, speaking at the annual Training Resources Applied to Mining conference. "The extensive efforts by MSHA and the mining community that held metal and nonmetal mining deaths to three during a seven-month period were instrumental in driving these numbers."

Main cautioned against complacency, noting four fatal mining accidents occurred in September 2016. "We are eroding the gains we have made on behalf of our nation's miners. Eliminating mining deaths and reducing injuries and illnesses is a goal that must be shared by all of us. We can, and must, strive to reach zero mining deaths," he stated.

For its part, MSHA is ramping up enforcement, outreach, and compliance assistance actions. In a recent conference call with industry stakeholders, the agency urged participants to reinvigorate their efforts to regain last year's momentum, which produced the safest period in mining history. "We are calling on all of our stakeholders, including mine operators, miners' organizations, associations, and trainers, to increase their attention to the conditions and hazards that are leading to fatalities," said Main.

The data also revealed efforts to lower levels of respirable coal mine dust and silica in the nation's coal mines remain on track. Since the 2009 launch of the *End Black Lung - Act Now* campaign, average respirable dust levels have decreased annually. Dust sampling results for the year, collected under the respirable coal dust rule which went into effect in August 2014, dropped to historic lows. During this period, the yearly average respirable dust samples collected by MSHA from the dustiest occupations in underground coal mines fell to 0.64 milligrams per cubic meter (mg/m3), down from the FY 2015 average of 0.70 mg/m3.

Mine operators and MSHA personnel have collected nearly 154,000 respirable dust samples under the new rule, and 99.3% of those samples met compliance levels. "The new respirable dust rule is working to reduce miners' exposure to unhealthy conditions, and that is good news for miners," said Main.



Joseph A. Main began working at coal mines in 1967. He has worked for more than 40 years to improve miner health and safety around the world.

Improving the quality of air that miners breathe is about more than just coal dust. MSHA continues its work to improve the air miners breathe through efforts on silica and diesel exhaust. In March, the Occupational Safety and Health Administration published its silica rule and MSHA is carefully developing its proposed rule on silica. In addition, MSHA has published a Request for Information on Exposure of Underground Miners to Diesel Exhaust.

While these milestones in fatalities and coal dust concentrations are historic, it is important to remember that one death is still one death too many. We need to continue efforts to ensure those who choose the occupation of a miner can go to work each and every day and return home safe and healthy at the end of each shift.

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Dan Wallander
 Menasha, WI



Successful Geothermal Drilling Campaign in New Zealand

Adapted from a Press Release by Eastland Group

New Zealand's Te Ahi O Maui geothermal plant near Kawerau, recently completed drilling a production well and two injection wells. The drilling process targeted known sources of geothermal fluid as hot as 390-570°F (200-300°C).

Project Manager Ben Gibson said, "The drilling was successful - we located the high-temperature fluid that will ultimately fuel the geothermal power plant, and the injection capacity necessary to manage the cooler fluids that have passed through [the] geothermal power plant."

Well pads were constructed on-site and the Old Coach Road was upgraded in preparation for the arrival of the drilling rig in late April. Drilling began in May following assembly, inspections, and karakia (ceremonial prayers), and blessings from local kaumatua (elders of the indigenous Māori society).

Gibson paid tribute to the internationally recognized drilling specialists who worked on the project including rig contractor, MB Century; ancillary service provider, Halliburton; and supervising engineers, Jacobs, together with a number of smaller contractors based locally and abroad. He also mentioned drilling was completed without any major incidents or harm to any person or the environment. "Drilling these wells to plan, without any major incidents, is testament to the professionalism, skill, and experience of the entire team," he stated.

The project focus now shifts to the construction of the power plant, transmission line, and steam field. Tomairangi Fox, cultural adviser to the project said, "We are very happy to have completed drilling, and the next stage is very exciting too."

The Te Ahi O Maui geothermal project has enlisted Israeli company Ormat for the next phase of the development. Ormat has a great deal of experience with developing and constructing state-of-the-art, environmentally-sound geothermal power plants, and has supplied geothermal power to over 23 countries around the world.

Matt Todd, chairman of the Te Ahi O Maui board and chief executive of Eastland Group, said he is pleased the project has partnered with Ormat for construction of the power plant. "Ormat has over 30 years' experience in the New Zealand geothermal energy industry and is involved in 12 geothermal projects around the country. They have the necessary skills and knowledge that we can rely on for the successful delivery of the Te Ahi O Maui project."

The new plant is due to be operational in 2018, and is expected to generate approximately 25 megawatts of electricity.



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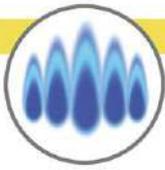
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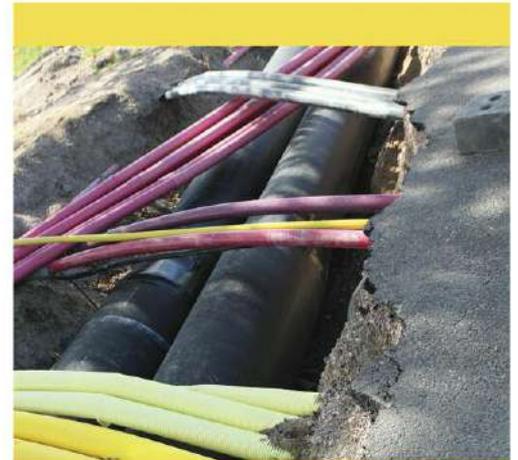
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REBELS WITH A CAUSE

Compiled by the Editorial Staff of
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Every year for the past decade, men have gathered in Enid, Oklahoma, to celebrate their own holiday; and it's everything you'd expect it to be. The men ride bikes and mechanical bulls, shoot guns, play poker, eat meat, blow stuff up, race old cars around a pond, and set things on fire. Man Day is true to its name as a men's-only event; but ladies, please don't be offended.

There's more to Man Day than meets the eye. All proceeds from the event go directly to clean water projects in Niger, Africa, one of the world's most impoverished countries.

It all began as a fun and goofy party for men in rebellion to Valentine's Day. Event organizer, Brent Kroeker, told Enid News: "It started with 17 guys just grilling and shooting, and doing anything that was 180 degrees from Valentine's Day. It's grown to what it is today to about 400, 450. Now it's the funding mechanism for the water well drilling we do in Africa."

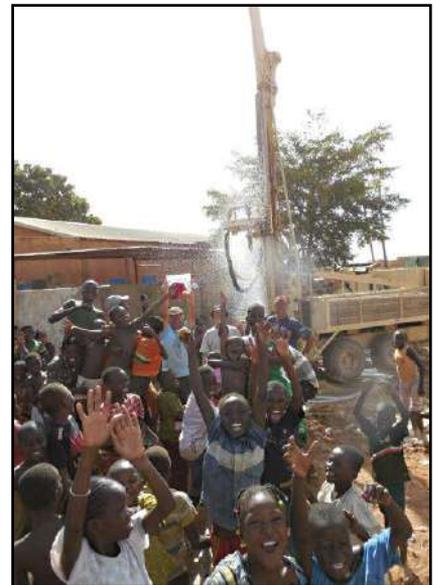
Kroeker said Enid has a tight connection with both Man Day and well drilling in Niger. In 2005, Man Day shifted from an anti-Valentine's-Day blast to a fund-raising opportunity when Emmanuel Baptist Church Pastor John Stam contacted Kroeker about going on a mission trip to Africa. Kroeker has regularly been on mission trips to Niger ever since.

Developmental health issues plague Niger due to the absence of a clean water supply. Kroeker said every well drilled in the country provides water to around 750 people. Nearly 130 wells have been drilled thus far, bringing unpolluted water to an estimated 100,000 people who previously relied on contaminated rivers and ponds.

Paying for travel expenses from their own pockets, "Man Day dudes" go to Niger several times a year to drill wells and support their missionary friends. Last year, Man Day raised over \$73,000, with every penny going toward water wells and hand pumps.

As a great reminder of the purpose behind Man Day, water well drilling demonstrations are included in the festivities. Event organizers bring at least one drill rig identical to the one used in Niger, and give a working demo for the guys to watch.

Based on the occasion's wild activities and loving support for water missions in Africa, Kroeker said Man Day "defines us as men more accurately, as our Creator intended."



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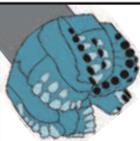
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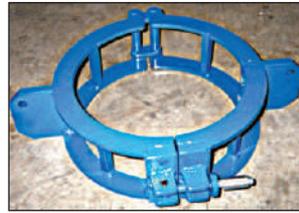
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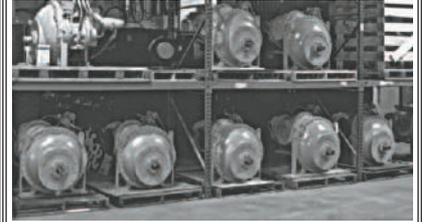
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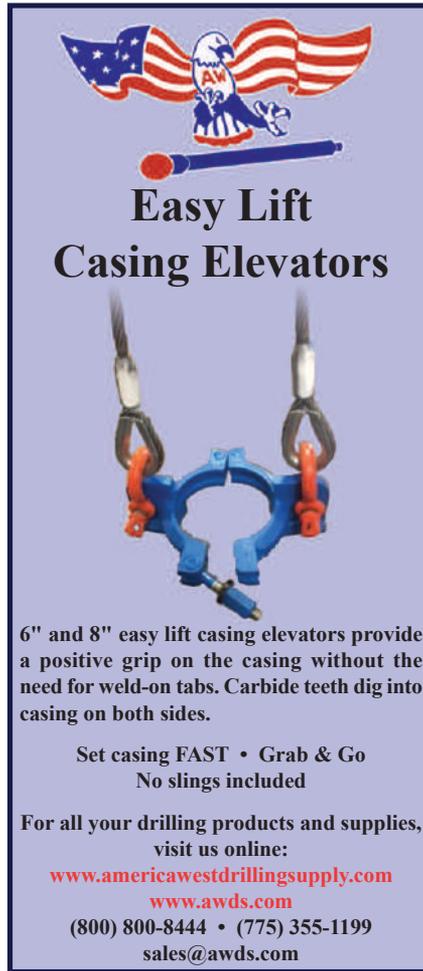
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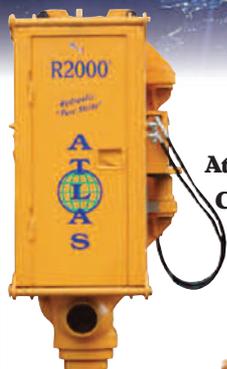


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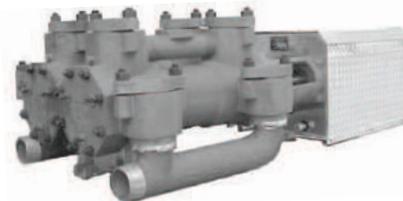
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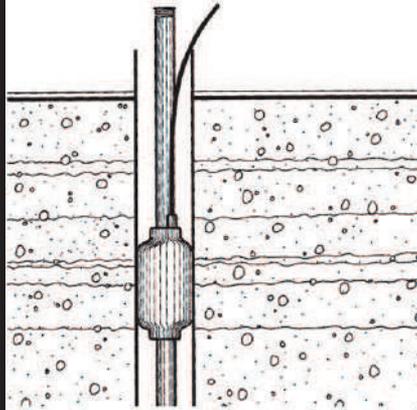
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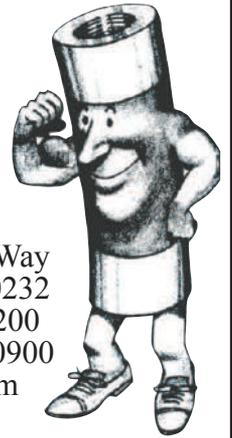
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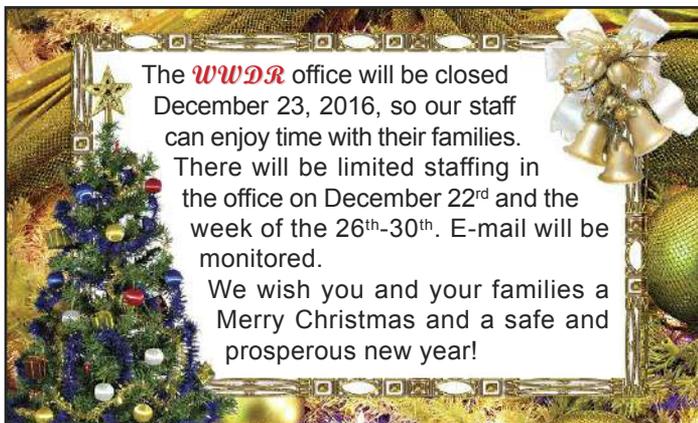
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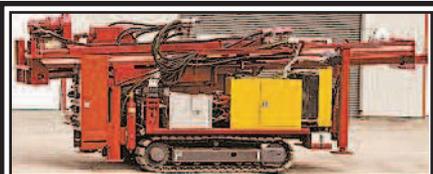
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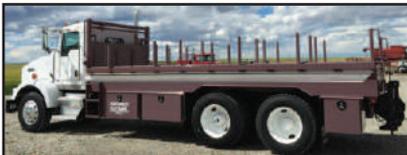
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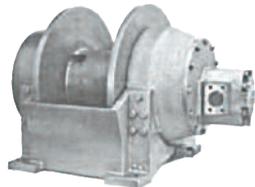
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