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Ronnie,
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With pen (computer) in
hand...

Yes, you blinked your eyes and there went winter, and here we are turning our clocks ahead an hour (in certain parts of our world that is). Before our very eyes, Spring has definitely sprung. So, get up and get to work - the sun is shining, the rains are here, and the water must flow - which not only helps water well contractors, but irrigation folks test those systems as well. Mining may have a bit of jolt here - but have no fear, the sun will dry out those muddy ruts and you'll be moving on once again. As for construction, even though some say there is no business, I'm afraid I really don't understand it since every place we

travel, there are roads and bridges which need core drilling, pilings placed, and more. So, I'm afraid someone will have to explain it to me a little better.

The one constant I have noticed, and this is a mere setback which should be overcome shortly, is the lack of people willing to pay for what they received in good faith. What say you? You have that problem? Can't be! Everyone is honest and always pays their bills or at least they attempt to. But alas, there may be that person who has had some difficulties and needs a little time. I bet if you just ask them to pay a little as they go along, you will build a much better, and longer lasting relationship with that customer of yours. Really, they aren't out to beat you. They are just, as you are, trying to make that almighty dollar stretch to cover everything. However, if they aren't willing to talk, perhaps then they ARE just deadbeats.

If, on the other hand, you are the person who is not paying and scared they will come after you with pitchforks or what have they, why not just merely talk to them? Let them know the situation, and by golly, they just might work with you to allow you to catch that account up and keep you in good standing.

This is from the horse's mouth, both instances . . . give it a try.

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This month's Hot Topic is Exploration/Blasthole

~ From the Cover ~

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Jet Pumps by Bill Corey

In the 1930s, jet pumps came into existence. Until then, if you wanted water with a pump, you had to be within 25 feet of the source. With the invention of the jet or packer, which is a pump all by itself, we now had the opportunity to draw water from 100 feet or more! Using Bernoulli's Law, there are three simple parts to a jet - the body, nozzle, and venturi.

The body is what directs the water coming from the pump, known as the drive water, to the back or inlet of the nozzle. It also takes the water from the venturi tube and moves it to the inlet or suction of the pump. There is also a hole connecting the well to what we call the mixing chamber.

There are three chambers in the body - one being connected to the drive pipe and ends with the water being forced through the nozzle. The nozzle is actually conical in shape. The big hole is where the drive water enters the nozzle, and in a very short distance the hole becomes much smaller. This is where Bernoulli takes over and forces the water through the smaller hole causing it to speed up. The reason we want this to happen is because on the outlet of the nozzle - the mixing chamber - the water velocity increases. Higher velocity means lower pressure. The pressure drops to the point it causes the well water to be pulled into the mixing chamber. Just on the outlet of the nozzle is also the venturi tube. The hole in it collects the mixture of well water and nozzle water, hence the name mixing chamber, and pushes it through the venturi. As the water moves through the venturi, the tube itself opens wider at the discharge, which allows the water to slow down. As it slows, it converts the high velocity into higher pressure and pushes the water out of the body into the pipe leading to the suction.

It is the hole size both in the nozzle and venturi which allows different amounts of water or pressure. Most single-stage horizontal pumps can go between 40-100 feet down. Back in the 30s, this was amazing. When you add more stages, you also allow for a deeper depth to water. Remember, the deeper you go the less water you get, but it still works.

In today's world, jet pumps are used more for booster applications, but there are those who still want the ability to work on their own pump before they have to call someone. Remember, do-it-yourselfers are not your competition, they are your customers.

Bill

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

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Product Spotlight

Pipe Threader Does the Job



The full-featured, high-performance Model 6590 pipe threading machine from Wheeler-Rex is capable of cutting, threading, and reaming pipe or tubing from 2½-6 inches outside diameter. Standard features include a powerful condenser motor with extremely quiet, two-speed operation. This workhorse also includes self-opening notch-type die heads, through the die-head oiling, blade-type cutter, three-stage oil filtration system, a five-flute reamer, foot switch, spare cutter wheel, four-leg stand, plus a three-year limited warranty. Optional accessories are also available for grooving and beveling.





EPA Does an About Face? Not Really

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

The U.S. Environmental Protection Agency (EPA) released its final report on the impacts from hydraulic fracturing on drinking water resources, and it has many in an uproar. Done at the request of Congress, the five-year study, *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States*, has sent mainstream media, and those opposed to the process into a frenzy.

Definitions were changed and wording was omitted, but in the end, the results were the same.

In initial reports, the EPA stated hydraulic fracturing activities, "have not led to widespread, systemic impacts to drinking water resources . . ." The final report removed the wording and instead, points to the circumstances which could potentially lead to groundwater contamination, such as:

- ▶ Water withdrawals for hydraulic fracturing in times or areas of low water availability, or with limited / declining groundwater resources;
- ▶ Spills during the handling of hydraulic fracturing fluids and chemicals, or produced water which results in large volumes or high concentrations of chemicals reaching groundwater resources;
- ▶ Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources;
- ▶ Injection of hydraulic fracturing fluids directly into groundwater resources;
- ▶ Discharge of inadequately treated hydraulic fracturing wastewater to surface water; and
- ▶ Disposal or storage of hydraulic fracturing wastewater in unlined pits resulting in contamination of groundwater resources.



Photo by Joshua Doubek.

Why was the wording removed? Well, according to EPA Science Adviser Thomas Burke, it was removed because of "gaps in information" which prevented the agency from determining how much contamination or the rate of impact. The American Petroleum Institute (API) accused the EPA of distorting the science. API Upstream Director Erik Milito said, "The agency has walked away from nearly a thousand sources of information from published papers, technical reports, and peer reviewed scientific reports demonstrating that industry practices, industry trends, and regulatory programs protect water resources at every step of the hydraulic fracturing process. Decisions like this amplify the public's frustrations with Washington. Fortunately, the science and data clearly demonstrate that hydraulic fracturing does not lead to widespread, systemic impacts to drinking water resources . . ."

Numerous studies have come to the same conclusion. No drinking water contamination from hydraulic fracturing has been found in the Marcellus, Utica, Barnett, Permian, Eagle Ford, Woodford, Fayetteville, Haynesville, Bakken, Denver- Julesburg, Piceance, Raton, or any other shale formation where oil and gas resources are being developed through the process. Just a few of those studies include:

- ▶ *Proceedings of National Academy of Sciences*, Yale University, 2015: "We found no evidence for direct communication with shallow drinking water wells due to upward migration from shale horizons."
- ▶ California Council on Science and Technology, 2015: "We found no documented instance of hydraulic fracturing or acid stimulations directly causing groundwater contamination in California."
- ▶ Wyoming Department of Environmental Quality, 2016: "Evidence does not indicate that hydraulic fracturing fluids have risen to shallow depths intersected by water-supply wells."
- ▶ *Groundwater and Geophysical Research Letters*, 2013: "It is not physically plausible for induced fractures to create a hydraulic connection between deep black shale and other tight formations to overlying potable aquifers, based on the limited amount of height growth at depth and the rotation of the last principal stress to the vertical direction at shallow depths."

amount of height growth at depth and the rotation of the last principal stress to the vertical direction at shallow depths."

- ▶ U.S. Department of Energy's National Technology Laboratory, 2014: Researchers injected tracers into the hydraulic fracturing fluid in a well in Greene County, Pennsylvania, to track for signs of possible migration. After 12 months of monitoring, the researchers found "no evidence of gas migration from the Marcellus Shale."

Nearly 275,000 hydraulically fractured wells have been drilled between 2000-2015, across 25 different states. With more than 8.5 million people getting their water from a source located within a mile of a hydraulically fractured well, one would think contamination would be more prevalent. What about spills? Even after reviewing nearly 500 spill reports from the fracking fluid chemical mixing process, the EPA found no documented impacts to groundwater from those spills.

Burke went on to say, "What we found is that although the overall incidents of impacts is low . . . there are vulnerabilities." People have such a negative view of hydraulic fracturing, but most don't take the time to do the actual research. The fact the EPA couldn't find any major or widespread impacts while using the most comprehensive report on the subject, should be evidence enough that the process is safe. The industry and current regulations are working to protect our groundwater resources, while supporting millions of U.S. jobs and contributing 8% of the nation's economy.

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

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Hot Off the Press

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WDR photo of Tread Corporation's Value Pumper vehicle on display at the 43rd Annual Conference on Explosives and Blasting Technique in Orlando, Florida.

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When Computers Go "Rogue"

by Britt Storkson
Owner, P2FlowLLC

Most of us have encountered a "rogue" computer. You know, the computer doesn't do what you tell it to do or does something you don't want it to do. The *Merriam-Webster Dictionary* defines rogue as a *dishonest, worthless, or mischievous person*. Some even fear computers becoming so sophisticated they will attempt to take over the world like something out of a science fiction movie.

You don't have to fear the science fiction movie scenario, but malfunctioning computers are a concern in many cases because we often depend on them to make critical decisions. For example: A computer failing to deploy the air bags installed in a car at the right moment during a crash could mean the difference between life and death. Almost as bad would be violent air bag deployment when the car is being driven normally, which could result in the driver losing control of the car and causing an accident.

Computer malfunctions can almost always be traced to two problems: hardware problems or software problems - or both. Computer hardware is anything we can see and touch . . . the silicon "chip", the printed circuit board, wiring, connectors, and related items. Any one of these components can fail, and render the computer partially or fully unusable.

Computer software is the "codes" or instructions which tell the computer what to do. Since not all of the software is used all of the time, problems can surface months or even years after the software has been released for sale.

This is why it is so important to test the software under ALL conditions, because if the computer encounters a condition it hasn't been programmed to deal with, it will probably do something wrong or not do something it is supposed to. This includes temperature, humidity, and impact conditions, as well.

Some things we would attribute to malfunctions or poor software really are a designed-in feature. Have you noticed on your smartphone how the icons often move around on the display . . . often more than they need to? Have you also noticed how an advertising icon will "scoot" under your finger so your finger press brings up an advertisement you didn't want instead of the link you wanted? Since some of those displays can sense finger proximity, as well as touch, the computer can "anticipate" where you are going to put your finger and rearrange the display accordingly.

Since computer memory is nothing more than voltages stored on silicon, "stray" voltages can alter the memory. Most computers have filters and other provisions to minimize these problems, and computer components have been greatly improved over the years to deal with this issue, but it happens. Sometimes memory retention can be a problem, which usually results in the computer "forgetting" what you tell it. Many computers have ways to detect problem memory areas

Storkson cont'd on page 20.

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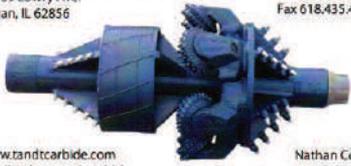
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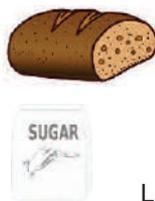
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Minerals Around the House

Adapted from Information by the Women In Mining Education Foundation

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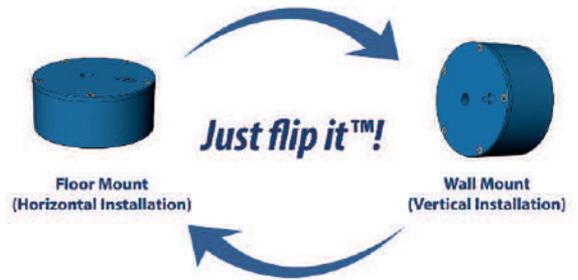
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WHO'S IN THE NEWS



The Texas Ground Water Association (TGWA) recently presented Mike Pyburn the President's Award and Contractor of the Year Award at the TGWA Annual Convention and Trade Show in San Marcos, Texas.

Look for additional announcements from TGWA and the Minnesota Water Well Association online at worldwidedrillingresource.info/Whos4-17.pdf

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

The CME-55LCX

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The compact CME-55LCX features a new 130 horsepower diesel engine and can crank out up to 12,100 foot-pounds of rotary torque. That's more than any other drill in its class.

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LEADING THE PUSH FOR RENEWABLE ENERGY IN THE PHILIPPINES

Compiled by the Editorial Staff of *WorldWide Drilling Resource*®

Geothermal energy is an indigenous energy source in the Philippines. Energy Development Corporation (EDC) is the country's largest vertically integrated geothermal energy provider and recognized as a world leader in wet steam field technology. They are using their influence to encourage the government to support the development of more geothermal projects. Their biggest selling point being geothermal is not only a clean and renewable energy source, but its cost, as well as supply, is stable.

EDC has overseen the successful development of numerous geothermal

energy products, and since 1983, has successfully developed, financed, built, and operated seven geothermal steam fields in five geothermal contact areas, containing both wet and dry steam. The total capacity of clean and renewable energy the company delivers is around 1400 megawatts (MW). Because of their success, the company does have pull when offering suggestions, which would provide energy variety to the country, thereby reducing the inherit risk found in relying heavily on one single fuel source.

While geothermal energy is the company's core, EDC continues to diversify their own renewable energy portfolio through investments in hydropower, solar power, and wind energy projects. The company successfully inaugurated the 1.03-MW solar rooftop system in Gaisona Capital's mall in the La Paz District, Iloilo City. The solar rooftop system is the largest of its kind in the province, and can supply up to 50% of the mall's daytime energy needs, which results in significant savings in electricity cost. Even more important to the company, the system pulls power directly from the sun and will not require the use of fossil fuels or other gases. In total, the solar rooftop will help the mall avoid emitting nearly 850 tons of CO₂ annually.



Solar rooftop of the Gaisona Capital mall, courtesy of Energy Development Corporation.

The solar rooftop represents EDC's initial venture into the solar rooftop industry, but they have finalized agreements for

the installation of similar solar rooftops in five other malls. The company is looking to expand its operation and influence through environmentally safe methods. They believe their track record has given them the expertise needed to assess the feasibility of future acquisitions and greenfield projects, which will ensure the safe and efficient construction of power plants and provide efficient operations for them in the future. Through their geothermal recommendation to the Philippine government and continued dedication to clean and renewable energy, the company looks to aid the country's consumers while reducing environmental effects.

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Mining Industry Loses an Education Champion

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

If you are lucky, you will meet someone who will inspire you to follow your passion in life. For me, one of those people was Arloa Woolford from the Women In Mining (WIM) organization.

Arloa Rae Woolford, passed away on February 25, 2017. She was born January 23, 1938, in Elko, Nevada, to Wilbur (Tim) and Edna Timmons of Midas, Nevada.

She was a staple in the mining industry, dedicating her time to enlightening

the public on the importance of minerals and mining. She traveled around the country educating teachers and students alike on the vital role minerals play in our daily lives and encouraged young people to join the mining industry when pursuing a career.

One of the many hats she proudly wore was with the Women In Mining Education Foundation. She not only helped create the foundation, she also served as president since its inception in 1993. She worked tirelessly toward the foundation's continued success until the time of her death.

Arloa is survived by her sons Tim (Kathy), Al (Kathy), and Mark (Danielle); grandchildren Jarod, Derek, Adrienne, Kassondra, Chloe, Samuel, and Lucas; as well as great grandchildren Allison, Landon, and Tucker.

A memorial service has been tentatively set for June 10, 2017, in Winnemucca, Nevada.

She has forever left an impression on many lives including my own, and she will be missed by many throughout the mining industry.



She helped coin the foundation's motto, "If it can't be grown, it has to be mined."

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Discovering More Than a Bare Hole

Compiled by Caleb Whitaker, Associate Editor
WorldWide Drilling Resource®



Construction workers often discover strange things underground, but a crew in Bolu, Turkey, had a unique barrier to overcome because of an expected find one morning. As the crew returned to their excavation work on a septic tank, they encountered a dirt-laden bear trapped deep beneath the forest floor. The animal is believed to have fallen into the septic tank after venturing onto a nearby farm for a bite to eat from its favorite chicken buffet.

The crew's rescue operation included creating a hole in the tank using a hydraulic hammer attached to an excavator. As they smashed the hole into the terrain, suddenly their trapped animal friend poked one of its paws and snout out, seemingly to try and give his rescuers a bear hug. However, the distraught bear was not in a good mood because of the loud machinery hammering away near its head. Unable to bear the noise, the trapped animal became distressed and clawed wildly in anger at the dirt, trying to gain its freedom. At first, the bear tried to make the hole wider on its own accord, and attempted to bite the helping machinery every time it got too close. Eventually, the drilling machinery was able to stretch the threshold of the cavity wide enough for the impatient bear to squeeze through and scamper up the slippery dirt to freedom. Once the relieved bear made it onto the grass, it darted away into the forest with no outward expressions of injury or embarrassment.

Excavations are sure to uncover interesting things buried beneath the earth, and occasionally something completely unexpected is found like a bear who overindulged on chicken and fell into a hole. So, when on a work site, always be prepared for those rare finds, and no matter what is discovered, always keep your bearings.

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A Helium Shortage? Not Anymore

Adapted from Information Provided by the University of Oxford

Tanzanian East African Rift Valley. Image courtesy of St. Hugh's College University of Oxford.

Helium doesn't just make your voice squeaky, it is also critical to many things we take for granted, like MRI scanners in medicine, welding, industrial leak detection, and nuclear energy. Recent years have seen worries about the over-exploitation of this extremely limited, finite natural resource, with fears the supply could not be guaranteed into the medium- to long-term future. In 2015, the British Medical Association expressed concern the helium supplies may need to be regulated.

Now, a new approach to gas exploration has discovered a huge helium gas field, which could address the increasingly critical shortage of this vital yet rare element.

Known reserves have been quickly dwindling. Until now, helium has never been found intentionally; it was found accidentally in small quantities during oil and gas drilling.

A research group from Oxford and Durham universities, working with Helium One, a Norway-headquartered helium exploration company, developed a state-of-the-art exploration approach. The first use of the method resulted in the discovery of a world-class helium gas field in Tanzania.

Research revealed volcanic activity provides the intense heat necessary to release the gas from ancient, helium-bearing rocks. Within the Tanzanian East African Rift Valley, volcanoes have released helium from ancient deep rocks and trapped the helium in shallower gas fields.

Diveena Danabalan, of Durham University's Department of Earth Sciences said, "We show that volcanoes in the Rift play an important role in the formation of viable helium reserves. Volcanic activity likely provides the heat necessary to release the helium accumulated in ancient crustal rocks. However, if gas traps are located too close to a given volcano, they run the risk of helium being heavily diluted by volcanic gases such as carbon dioxide, just as we see in thermal springs from the region. We are now working to identify the 'goldilocks-zone' between the ancient crust and the modern volcanoes where the balance between helium release and volcanic dilution is 'just right'."

Professor Chris Ballentine, Department of Earth Sciences, University of Oxford noted, "We sampled helium gas (and nitrogen) just bubbling out of the ground in the Tanzanian East African Rift valley. By combining our understanding of helium geo-

A Helium Shortage cont'd on page 26.

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Storkson cont'd from page 10.

and will assign critical memory to other or multiple memory locations to maintain memory integrity.

While computers are great technology and, when properly constructed, they can be entrusted with many tasks, nothing is perfect. We're fortunate most computer hardware failures are of the all-or-nothing variety. Most computers either work right all of the time or they don't work at all.

I could cite many examples of computer malfunctions impacting our lives, but one recent experience was a false fire alarm. My wife and I went on a two-day get-away for some rest and relaxation, and checked into a hotel for the night. All went well until the fire alarm went off at 2:30 a.m. This was simply the fire alarm going off when it should not have. Nobody pulled the fire alarm lever. When this happened, the hotel guests gathered in the lobby as they were supposed to and the fire department with their trucks and firefighters arrived shortly afterward. The fire department personnel checked for problems and told the guests to go back to their rooms because it was a false alarm.

The next day we noticed the fire alarm equipment technicians working on the alarm control panel which was located near the hotel entrance, so we thought everything had been "fixed". That night, the fire alarm went off again, also at 2:30 a.m. Again, the hotel guests gathered in the lobby and the fire department with their trucks and firefighters came to visit one more time. Just like the night before, the fire department personnel checked for problems and told the guests to go back to their rooms because it was a false alarm.

Now while I would rather have a false alarm and no fire as opposed to a fire and no fire alarm, this is a critical system and it should be better than that. Unfortunately, there are far too many critical systems failures which shouldn't happen, which will be the subject of the next article.

Britt

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

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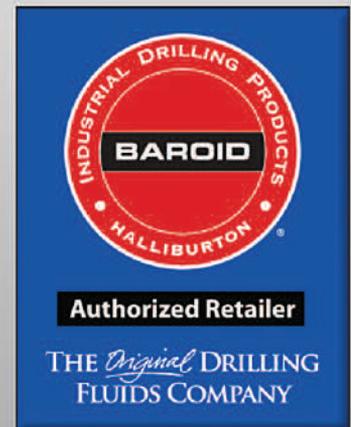
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Drilling Into Money Not Boring

by Mark E. Battersby

The Future of Pass-Through S Corporations

S Corporations have been around for some time and are very popular with those in the drilling industry. However, while it's too early to predict what effect any tax legislation in 2017 will have on the 4.6 million businesses currently operating as S Corporations, significant changes may be in the works.

An S Corporation is merely an incorporated drilling contractor, supplier, distributor, or manufacturing business which has chosen to be treated as a partnership for tax purposes. It offers some appealing tax benefits while providing its owner/shareholder with the liability protection of a corporation. The income and losses of S Corporations are passed through to its shareholders and included on the shareholder's personal tax return. As a result, there is just one level of federal tax to pay.

On the downside, S Corporations are subject to many of the same rules and regulations corporations must follow, often resulting in higher legal and accounting fees which must be paid. The S Corporation must also file articles of incorporation; hold directors and shareholders' meetings; keep corporate minutes; and allow shareholders to vote on major corporate decisions.

While the income and losses of S Corporations are passed through to the shareholders, shareholders can only deduct those losses up to the amount they have invested in the drilling operation - their "basis." Basis includes equity investment (adjusted for profits and losses) and any direct loans made by the shareholder to the S Corporation.

Today, thanks to S Corporations and other pass-through business entities, most business income is being taxed at the individual tax rate, inflating the annual incomes of business owners and making the income a target for "reform." There's general agreement the marginal tax rate on regular C Corporations is too high, but if it's cut, pass-through S Corporations wouldn't get a cut and may even face a tax increase.

One suggested alternative would give pass-through businesses a reduced tax rate compared to the wage income proposals of President Trump (a 15% rate cap) and the House GOP (a 25% rate cap). Both plans have a top ordinary tax rate of 33%, according to reports.

Although the rules for switching to or becoming an S Corporation are complex and require monitoring in the months ahead, the advantages for many drilling businesses make the sums spent for professional advice and/or guidance well worthwhile.

Mark

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

Morale is when your hands and feet keep working when your head says it can't be done.

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Tales from the Field

by **Jeremy C. Wire**
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A Mystery "Well"

Not long ago, I received a telephone call from the manager of a large ranch which has been a client of our company for some years. He said, "I think I have discovered a large-diameter water well no one knows about; you need to come check it out . . ."

On an 8000-acre ranch in California, with a long history of operation, this situation is very likely. I agreed to have a look, as there are still shallow, large-diameter "hand dug" wells in existence, some of which when they became dry, were deepened with conventional drilling equipment. Any potential source of water is always of interest to this ranch in drought times!

Upon inspection, we determined it was not a water well, although initially it looked like one, and was behind a small ranch house as part of a long-abandoned old homestead, located some distance from the home ranch. This "mystery" well must have served another purpose, now long forgotten. When thinking about this, I remembered hearing stories about life on a family ranch in southern California at the turn of the last century, and what they



used for lighting. A brief online search confirmed my thoughts on the purpose of this device, and it became the focus for further inspection and discussion with the ranch manager.

On a later trip to the ranch, after breaking through some thick weeds leading to the back of the old house, the picture accompanying this story shows the opening of the mystery "well" which was exposed. It is an acetylene gas generator, not uncommon at the turn of the last century in rural areas (and some cities) for lighting as an alternative to kerosene lamps, where no electricity was available. It is just a very large version of a miner's lamp using calcium carbide to generate acetylene. The "well" is about four feet in diameter, about six feet deep, and is buried in the ground, so if the gas exploded, the flying debris wouldn't hurt anyone. The picture shows the conical basket which held the calcium carbide, and the drip tube for water across the top of it, the water being supplied by gravity from a spring source and small reservoir behind the house. The calcium carbide could be purchased in bulk quantities, as in 50-pound sacks. Further inspection inside the house revealed a small acetylene gas water heater partly hidden in a wall closet. No remaining light fixtures existed, however.

We tend to take for granted our electrical grid and the many conveniences it provides, but this wasn't always the case. Some rural areas in this country were not electrified until the 1930s, with construction of such projects as the Tennessee Valley Authority, Bonneville Power, etc., which probably caused the demise of acetylene generators for rural home lighting, such as this example.

You never know in this business what interesting things you may find in the field. For readers who may have further curiosity about the construction and historic use of these devices, check online under "acetylene gas lighting" for some pertinent articles.

Jeremy

Jeremy Wire may be contacted via e-mail to michele@worldwidedrillingresource.com

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EXPONOR is a biennial exhibition of global technology and innovation for the mining industry in Antofagasta, Chile. The 2017 edition is set for May 15-19. This comprehensive event showcases products, services, innovations, advances, and improvements in mining. Some of the specialized merchandise in higher demand right now include drilling rigs, hardened drill bits, blasting materials, mine ventilation equipment, robotics, mine doors, underground logistical systems, and remote optical sensors. A series of complementary activities during EXPONOR includes strategic conferences, technological launches, social events which also involve the local community, and mine tours. Everything is geared toward developing and strengthening mining business networks at the national and international level.

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John Folmar (C) of Folmar Drilling Company in Pickton, Texas, was proud to show his new Pulstar pump hoist with Marty and Barry at the recent Texas Ground Water Association event in San Marcos, Texas.



Alan and Marvin from Phoenix, Arizona, received the keys to Empire Pump Corp.'s new Pulstar pump hoist from Albin during the Mountain States Ground Water Expo in Laughlin, Nevada.

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A Helium Shortage cont'd from page 19.

chemistry with seismic images of gas-trapping structures, independent experts have calculated a probable resource of 54 billion cubic feet (bcf) in just one part of the rift valley. This is enough to fill over 1.2 million medical MRI scanners. To put this discovery into perspective, global consumption of helium is about 8 bcf per year and the United States Federal Helium Reserve, which is the world's largest supplier, has a current reserve of just 24.2 bcf. Total known reserves in the USA are around 153 bcf. This is a game changer for the future security of society's helium needs and similar finds in the future may not be far away."

Professor Jon Gluyas, Department of Earth Sciences, Durham University, said the helium discovery was an outstanding example of industry and academia cooperating closely to offer authentic value to society.

Dr. Pete Barry, Department of Earth Sciences, University of Oxford, who sampled the gases added, "We can apply this same strategy to other parts of the world with a similar geological history to find new helium resources. Excitingly, we have linked the importance of volcanic activity for helium release with the presence of potential trapping structures, and this study represents another step towards creating a viable model for helium exploration. This is badly needed given the current demand for helium."



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Here We Go Again

by John Christ
J.C.'s Drilling Consultant

As I said last month, Ronnie really wants me to continue writing articles. After throwing ideas at each other we decided a mud guy should write about mud. So the series is going to be: *Mud In Your Eye*; *Here's Your Mud*; *Mud, Mud, Everywhere Mud*; *Water Plus Clay Equals Mud*; or hey - a little help here! Do you have a catchy name? Send them to me at the e-mail below. We are going to talk about all aspects of drilling fluids, solids control, calculations, grouts, etcetera. I will be getting help from the manufacturers, but also want stories from you people using the products. Why you use it, or why did something work or better yet, why it didn't work? I will also be answering your questions.

There will be no product endorsements! The main purpose is so the masses understand what a drilling fluid or grout is, and how it can ultimately reduce your time on the jobsite and cut your costs. I would also like to cover industry events. Are you having a mud- or drilling-related event? Let me know and I will be more than happy to help anyway I can. This will never replace the manufacturer's mud or drilling schools! They have limited space for their schools and I can also reach people. I encourage everyone to seek as much information from as many sources as you can. Knowledge is power! Knowledge is money in your pocket.

What industries will we be addressing? The industrial drilling markets - water well, horizontal directional, and construction primarily. Each industry has certain products unique to its way of drilling. We touch on the different types of drilling methods within the different industries. There are many uses for bentonite besides just drilling fluids. We will talk about those different uses.

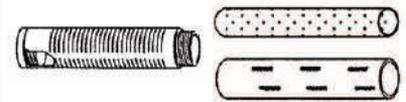
Did you know you can bathe in bentonite to remove toxins from your body? Funny story, this lady in Michigan was paying \$300 a bag for pharmaceutical-grade bentonite, for toxin removal. She was having a well drilled at her house and asked what he was using for his drilling fluid. He said it was bentonite, to which she inquired how much it was. Well, needless to say, it was a lot less than what she was paying. It was also suggested it was not quite the same as what she was using. First of all, there is a very minimal amount of sand in this grade of bentonite you may not want in parts of your body. Not to mention, the additives were a little slimier than the one she was using.

I would like to hear your stories. How about sending in photos of your operation? If it's something unique, I may ask if I can write something about you and/or your operation. Remember, this isn't for commercials.

So, I guess we will start with the biggest part of a drilling fluid. Can you guess what it is? You will just have to wait and see. So, like I said, looking forward to communicating with some old friends about something I'm very passionate about. Until



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then, go forth and drill the best hole you possibly can and, more importantly, give your customer more than they expect. It will pay you multifold!

*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**.*

John

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

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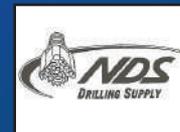
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Today's Gifts

by Tim Connor

Ever receive a surprise card in the mail for no reason? A telephone call from someone special? How about a letter from a distant friend? Or even an unexpected check? Every day, each of us receives gifts from life. Many may not seem to be all that worthwhile, while some can change your life forever.

Last week while driving to my favorite lunch spot, a car in front of me stopped in the middle of the road for no apparent reason. As I looked in my rearview mirror, I noticed a car approaching like he needed my spare tire. Fortunately, he stopped in time (I guess his spare was new) and avoided ruining my day. A gift? You betcha. I will guarantee, before this day ends, you will receive a gift from life. Oh, it might not be a lottery check, but which would you rather have: a big check or not spending several days (or even months) in a hospital bed?

As we move through the hours of our days, we tend to miss many of these timely and often special gifts. And we fail to send others our gifts ~ a pleasant smile for no reason, a kind word which was unsolicited, a few minutes of our time, a listening ear, an open mind, a thank-you card or e-mail of appreciation for anything or no reason.

These are just a few of the gifts we can send others - and they don't take a great deal of energy, money, or time, but they can often make a big difference in someone's life. Have you ever thought how someone else's gifts have made you feel?

We are all in too much of a hurry today to get somewhere, do something else, accomplish anything, make a buck, or to do nothing. In the end, how much of this really matters if you have failed to recognize the gifts you have received, or if you have avoided sharing your gifts with others?

There are some people who would really benefit from your gifts today ~ the elderly, children, the abandoned, people in emotional pain or suffering, people with health challenges, your own family members, people who are alone, or even a total stranger. Don't let this day pass without showing gratitude for the gifts you have received and sharing some of your gifts with the world around you.

In His service,

Tim

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

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In Memoriam

of our dear friend, Lyn Ortt



Trying to find just the right words to share with each of you on such a loss as a person of Lyn Ortt's character, stamina, smiling virtue, friendly manner, is like trying to go back some 20 years in life and reliving each and every day all over again. That is an impossibility and I know, no matter what words I put down on paper, they would not do her justice. She was a friend to many, a caring nurturing person to many, she loved her husband and their daughter with all her heart and it showed a thousand-times fold.



Lyn was born in Toronto, Canada, grew up in Barrie, Ontario, where she completed her nursing training, graduating in 1965. Along came the love of her life, John David Ortt and the young couple settled in Fergus shortly thereafter and were blessed with daughter Kelly in 1970. As a new future lay ahead of them, the family moved to a farm in West Garafraxa, which was in fact a great change to growing up in town for Lyn.



In the early 80s, Lyn left nursing to work alongside her husband in the new ventures of several pump companies. But alas, she ventured out again, starting her own business, Just For You, selling nursing uniforms and promotional wear. She loved the outdoors and gardening, a nice chardonnay, and their beloved Springhill Farm.

It is difficult for me to comprehend she was diagnosed with ALS the same year and month my husband died, October 2014. I had no idea she was going through this until her husband John spent some time with me in Las Vegas (his last trip and our last visit).



On to some happy times in the adventures of Lyn Ortt, a special person in her own right. Many of the photos shared recently about trips in North America showed her bright smile with her many Canadian friends. But I think I may have found just a view more you might enjoy.



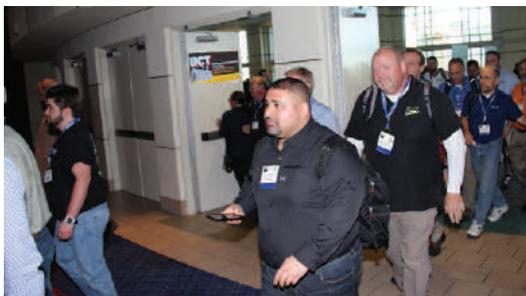
The upper righthand photo was taken as she and John helped Al and me kill some time during our first Canwell when luggage had gone astray.

The one to the upper left and two just below are her during an Atlantic Province Conference. The best one is her, here on the right, not believing she was in miner's gear.

We here at *WorldWide Drilling Resource*® send our sincerest sympathies to Lyn's family and friends worldwide.

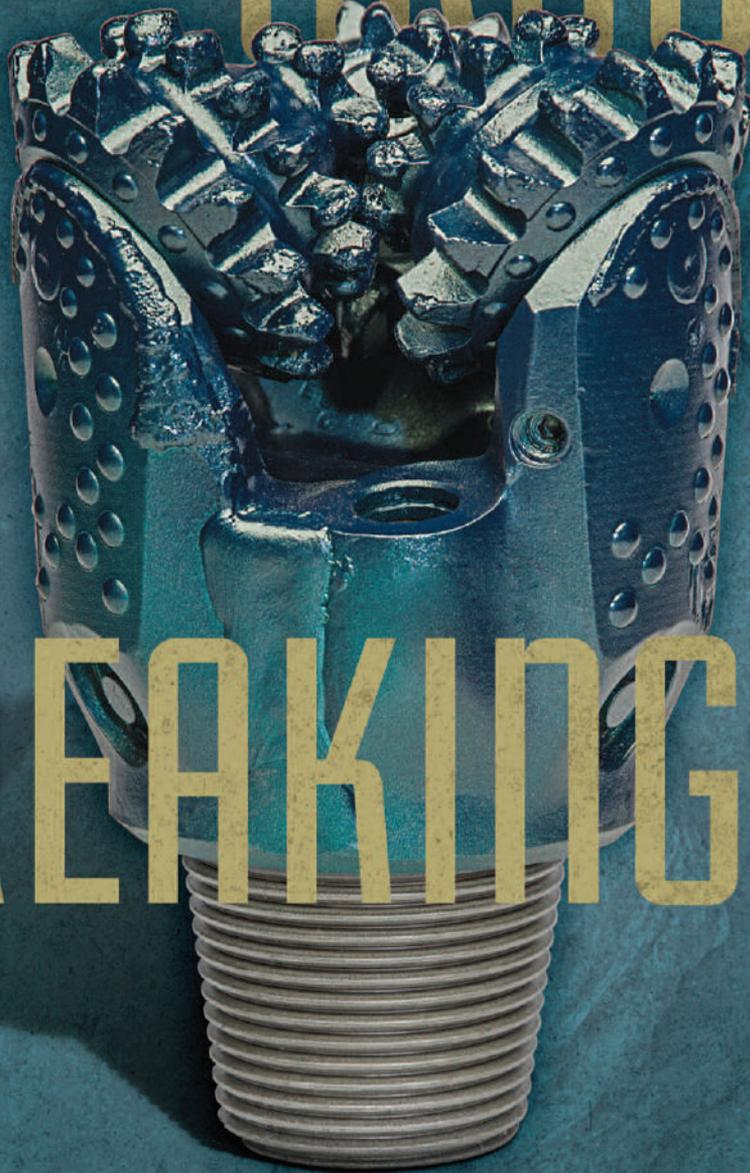
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"Throughout history, poverty is the normal condition of man. Advances which permit this norm to be exceeded - here and there, now and then - are the work of an extremely small minority, frequently despised, often condemned, and almost always opposed by all right-thinking people. Whenever this tiny minority is kept from creating, or (as sometimes happens) is driven out of a society, the people then slip back into abject poverty. This is known as 'bad luck.'"

~Robert Heinlein

The Un-Comfort Zone II

by Robert Evans Wilson, Jr.

Nobody Wants You to be Creative

Your boss, coworkers, friends, and even your family don't want you to be creative. They resent your trying to change the methods, practices, systems, and rules they are comfortable with. They think you're a fool for wasting your time and money. Innovation requires



change, and change is threatening to many - especially if your idea will displace an established interest. Expect resistance.

In 1942, economist, Joseph Schumpeter coined the term: "Creative Destruction" in his book *Capitalism, Socialism and Democracy*. It describes the process of transformation caused by innovation. The process begins when entrepreneurs, who generate new products or ways of doing things, destroy the value of older established companies who previously created new technologies which disrupted the companies that came before them. As an example, look at the history of recorded music: vinyl records and reel-to-reel tape were replaced by 8-track tape, which was replaced by cassette tape, which was replaced by compact disc, which has been replaced by MP3 players. Resistance is futile.

If your idea is any good, those established interests will first try to discredit it. The better your idea, the more they will attempt to make it - or even you - look like a threat to society, children, or puppies. Alternative religions will be called cults. Alternative political systems will be condemned as the cause of chaos.

Whether it is an established industry, government, or religion, the people who hold the power will fight to keep it. They get to choose the direction and will reward those who follow without question. Those who are in charge of established organizations control the resources which enable them to preserve their way of doing things. This is why major corporations love regulation. They can afford it, but newcomers and upstarts cannot. Those who wish to innovate or make changes must have their own resources to promote their idea; otherwise they'll grind along, perhaps for years, before they succeed - if ever. People rarely give up power. For a company to embrace a culture of creativity, it means employees must be allowed to act in ways which work against the strategies that made the company successful in the first place. Not many can see the value of doing this.

Creativity causes uncertainty, which in turn causes insecurity. Most people want to avoid it. In fact, they tend to attack things that are new to them. This is why there is so much pressure to conform.

We're comfortable doing things the way they have always been done. Newness, however, is mystifying. We don't know how it will work. Something might go

Wilson cont'd on page 40.



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*by Tom Kallman, President and
CEO, Kallman Worldwide, Inc.*

No person, company, or country succeeds in isolation. Success comes from partnership and teamwork. The long-standing and growing partnership between the U.S. and Chile is proof that when it comes to bilateral trade, cooperation pays off for both parties, particularly in the mining industry. Well into the second decade of the Free Trade Agreement between our two countries, the U.S. has solidified its position as the top supplier of equipment, products, and services to the mining industry in Chile, enabling our partners there to maintain their leadership position among the world's top producers and exporters.

Next month at EXPONOR 2017, the biennial Global Technology and Innovation Exhibition for the Mining Industry, May 15-19 in Antofagasta, Chile, our mutual success will be on full display. Despite the ups and downs of global markets, and an increasingly dynamic and competitive global mining economy, the strength and momentum of the U.S.-Chile relationship will certainly influence discussions and impact deals during the show.

EXPONOR's designation of the U.S. as the show's official Guest Nation promises to heighten awareness of our country's commitment to the region's operators and operating communities.

More than 60 American companies will be exhibiting, the majority located in the new USA Partnership Pavilion organized by Kallman Worldwide for the second consecutive edition in the show's Silver Pavilion hall. From specialized machinery, heavy construction, and energy equipment, to instruments, lighting, and safety products, U.S. exhibitors will represent a wide scope of the nation's most innovative and reliable exploration, extraction, and processing solutions.

Whether they are publicly traded stalwarts or small- and medium-sized enterprises, U.S. exhibitors are all looking to initiate or strengthen business relationships in Chile, either as prime contractors or subcontractors in support of in-country operators, service partners and their end-user customers. Many, such as DuPont, Flexco, and Soltex already have an operational presence and equity stake in Chile.

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[about the *WWD* magazine during the recent UCT event in Fort Worth, Texas]
"I read it religiously every month."

Harvey Svetlik
Staff Engineer - Energy & Water
GF Piping Systems

In fact, the ultimate measure of EXPONOR's success for Chile and the U.S. may well be jobs. Job growth is a cornerstone of our successful free trade agreement, and it is a universal measure of economic security. Whether America is helping to create jobs in Chile through investment in local operations or Chile is creating jobs in the U.S. with its growing demand for our expertise, equipment, and services, the more people we employ as partners, the stronger our partnership will be.

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Adapted from Information by Hose Solutions, Inc.

Stovepipe Wells, in California's Death Valley, is a long four-hour drive from the next town. So when the National Parks Service decided to replace the submersible pump at a well located at Stovepipe Wells, they had to consider the cost of deploying equipment to the area.

With previous pump change-outs, the contractor would spend a couple of days on a simple project because driving to and from the site took so much time. Replacing parts was also very costly due to the remoteness.

When the project was put out to tender, a contractor suggested using flexible drop pipe instead of steel pipe. In addition to being totally non-corrosive, flexible drop pipe does not scale internally. The flow rate on day one is the

flow rate for the life of the pipe; and when using solar power for the energy source, as was the case with this project, it is essential to run pumps as efficiently as possible.

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In this project, the contractor arrived on-site and got down to connecting the two 80-gallon-per-minute pumps and splicing the power cable. Then they connected 100 feet of 3-inch flexible drop pipe to the patented double-ring fittings before attaching the cable straps which supported the power cable along the length of the hose. Once everything was connected, it took 20 minutes to lower the pump into the ground.



Open the Doorway to all the Event Photos during the 2017 Texas Ground Water Association Annual Convention & Trade Show.



To see all the pictures from this event, go to: www.worldwidedrillingresource.info/gallery/2017/TGWA2017, or just click [here](#).

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Association Celebrates More than 70 Years

*Adapted from Information by the
North Carolina Ground Water Association*

The North Carolina Ground Water Association (NCGWA) celebrated over 70 years of service to the state's groundwater industry during its recent annual convention and trade show, in Greensboro, North Carolina, this past February.

The first convention was held in Raleigh, in December 1946. The formation of the association provided a foundation for the structure of events and activities. This began in June of 1946, when 13 well drilling professionals and company representatives met at the Robert E. Lee Hotel in Winston-Salem.

It is the only organization representing the professional and business interests of the North Carolina water well contractor and pump installer, while at the same time supporting scientific and educational efforts to preserve natural groundwater resources.

The NCGWA would like to thank everyone for their support over the years and looks forward to 70 more.



Past presidents able to attend the event were Elmer Newman, Mike Floyd, John Boyette, Jr., Dave Hutson (kneeling), Ronnie Venable, Paul Stewart, and current President Chauncey Leggett.

Remembering North Dakota's First Oil Well

Adapted from Information by the American Oil and Gas Historical Society

After decades of drilling dry holes from one corner of North Dakota to the other, the state finally saw its first oil discovery on April 4, 1951, when the exploratory well on Clarence Iverson's farm, northeast of Williston, finally began producing. The well had previously endured blizzards and been "shot" with perforation tools several times. This discovery in Mr. Iverson's wheat field launched the first drilling frenzy in the Williston Basin and helped reveal the prolific basin stretching from North and South Dakota, and Montana, up to Canada.

Although the early wildcat drilling attempt in North Dakota faced great skepticism, 30 million acres were under lease within two months of the 1951 discovery.

A 2008 article in the *Bismarck Tribune* quoted Sid Anderson, the former state geologist, who was a college student at the University of North Dakota at the time of the state's first oil discovery. "It was brand new then, and pretty exciting times," said Anderson. "The amber-colored oil in the area was of such high quality you could have run a diesel with it straight from the well."



A picture of the Clarence Iverson No. 1 derrick surrounded by snow appeared in the Williston Daily Herald in the 1950s.

Mr. Iverson was reportedly displeased when seismologists exploded dynamite in his wheat fields looking for oil. His son Cliff, who was 20 at the time of the discovery on the family farm, remembers his father smiling when oil surfaced for the first time. The farm became one of the largest tourist attractions in the Upper Midwest after the discovery. Cliff said people knew they were witnessing history being made, and the well changed many lives.

The Clarence Iverson No. 1 well produced 585,000 barrels of oil over 28 years. Clarence Iverson died in 1986, a wealthy man, who according to his son, "never got used to all that money."

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Exploration of Nevada for Lithium Continues

Adapted from a Press Release by Advantage Lithium

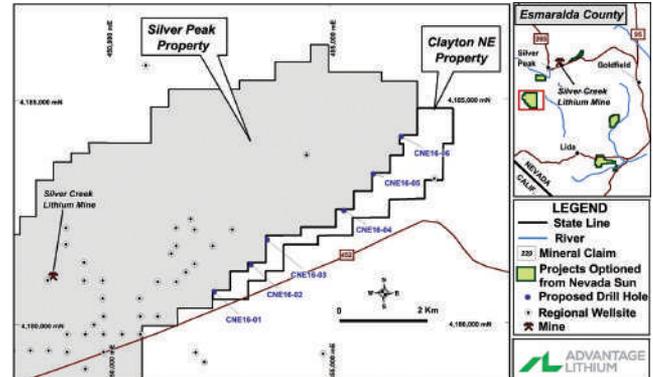
Advantage Lithium Corporation and its partner, Nevada Sunrise Gold Corporation, announced it has started its drill program at its Clayton NE property, in Clayton Valley, Nevada. O'Keefe Drilling of Butte, Montana, has been retained to conduct the drilling of three boreholes to roughly 4500 feet using reverse circulation equipment. These boreholes will focus on high-priority lithium brine targets bordering Albemarle's Silver Peak lithium brine production wells.

Three priority drill targets have been chosen to best intersect the broadest and most conductive zones detected by recently completed DC (direct current) resistivity survey.

The United States Geological Survey conducted drilling in the area more than 30 years ago and encountered lithium in the groundwater at around 480 feet. The lithium values ranged from 24 parts per million (ppm) to 110 ppm, averaging 69.3 ppm for a group of 11 samples, and averaging 65.75 ppm for another group of 12 samples, analyzed both in the laboratory and in the field. The company believes drilling deeper could intersect additional aquifers potentially hosting brines of similar or better contents of lithium.

David Sidoo, president and director of Advantage Lithium said, "In line with our strategy of growth via acquisition and the drill bit, we are very pleased to be starting our first drill program at Clayton NE, which benefits from both its geology and its proximity to Albemarle's lithium production wells, as well as our access to water rights in the region."

In September 2016, a 3-D resistivity ground geophysical survey successfully imaged highly conductive zones at Clayton NE. These zones are interpreted as brine formations and extend to the survey limit of approximately 2600 feet.



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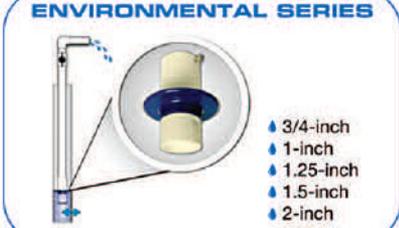
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Wilson cont'd from page 32.

wrong. It might be dangerous. Besides, having to learn a new way of doing things is an inconvenience. On the other hand, incremental ideas are more easily accepted. A radical idea - regardless of its benefits to all involved - will take more time and effort to convince people of its value. If people feel unsure or insecure about making a change, they will have negative opinions about it. The more insecure someone feels, the less they will be able to recognize the benefits of a new idea. We call these people stubborn.

Most people are only willing to take the innovative risks when they are desperate, already failing, and out of options. Situations like when a quarterback makes a "Hail Mary Pass" in the last seconds of a game - it is this sort of innovation which inspired the well-known adage: *Necessity is the Mother of Invention*.

People and companies love to give lip service to wanting creativity, but the truth is, only the creativity which leads to a useful and profitable innovation ever gets celebrated.

So, don't feel bad when no one supports your crazy ideas - just understand they are simply afraid. Follow your passion and follow your dream. Even if your effort fails, you'll learn something which may be useful in your next attempt. From my perspective, there is nothing more fulfilling than the natural high you get from being enmeshed in the creative process.

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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Battelle Continues Search For Deep Borehole Field Test Site

Compiled by the Editorial Staff of *WorldWide Drilling Resource*®

The Deep Borehole Field Test (DBFT), a research effort conducted by Battelle Memorial Institute, has once again been rejected by citizens local to a proposed site for the endeavor.

Originally covered by *WWR* in our March 2016 issue, the Deep Borehole Field Test is a project with a specific question to answer; namely, it seeks to establish whether or not geologic disposal is a feasible means of handling certain types of the country's nuclear waste inventory.

Currently, U.S. Department of Energy (DOE) sites house the result of a half century's worth of research on nuclear weapons and the by-products of building our nation's nuclear arsenal during the Cold War and World War II. Boreholes into granite formations deep underground could be a potential solution to the very real problem presented by nuclear waste buildup, but there simply isn't enough science to back up the idea. The DBFT's purpose is to discover how suitable granite would be for stipulated kinds of nuclear disposal, operating on the idea that if waste can be stored deep in the earth in Precambrian geology (which has been stable for millions of years), it will never interact with earth's biosphere. The project is expected to take approximately five years.

Although the study is intended for research purposes only, it has yet to be put into motion, facing too much opposition from the communities local to proposed test sites. Thus far, counties in both North and South Dakota have effectively halted the initiative, despite the positive economic impacts the project would have.

Supporters of the project point out potential benefits include increased revenue from sources such as local dining and grocery establishments, retail shopping, and lodging for the influx of workers. The job market would also experience growth as a reflection of the project with the addition of jobs in construction, carpentry, and electrical fields. Dollars spent by Battelle for resources needed to run the study, like fuel and water, could also significantly boost the local economy.

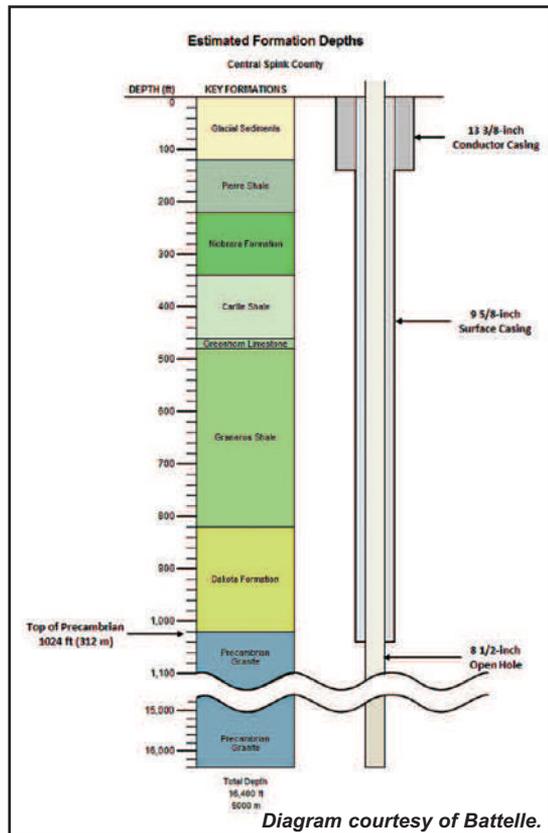
The stoppage is a direct result of a lack of trust as naysayers are quick to point out fears that the DBFT could lead to eventual nuclear waste storage in the test sites, despite reassurance that no radioactive material will be present before, during, or after the test is conducted. The project is meant to serve merely as proof-of-concept; put simply, it's all about the science. The tracts of land originally picked for the site were chosen because

they were far from any active earthquake zones, weren't near any oil or gas drilling, and had the kind of solid crystalline "basement" rock the government was looking for.

Bill Wicker, a spokesman for DOE's Office of Nuclear Energy, said the following in an effort to soothe the local public's concerns: "We are committed to choosing potential disposal sites through a consent-based process that would involve local and state governments, and any affected Tribes."

Currently, leaders of the DBFT project are reviewing other bids to find a suitable location. Contenders in South Carolina and Texas are both being considered.

The deadline for the June issue is almost here!
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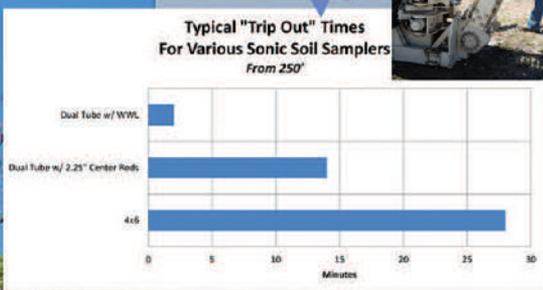




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Rookie is Off to Nevada

by Betsy Willett, Public
Relations Professional

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Off to Mesquite, Nevada, for the Utah Ground Water Association (UGWA) with Ronnie leading the way. UGWA kicked off early Wednesday morning with the golf tournament. We were all joking around and laughing because the winds were a force to be reckoned with. When everyone teed off, the ball was blown either into the sand pit or bushes, and a few just barely rolled off the tee. The turnout to play was great and everyone seemed to enjoy themselves while changing up the rules as they went. Those mountains behind the team pictures were a nice touch, don't you think?

Some of you may not know what it

takes for the association, location staff, and vendors to get everything organized for these conventions, but it's a lot of hard work. Take a moment and look at the gallery pictures, we made sure to get some before and after shots. UGWA did a wonderful job with placing all of the vendors throughout the room, making sure they didn't need anything, and even placing incoming packages in their booths. Oh, Travis . . . did you ever find your box?



UGWA Golf Tournament. *WWD* photos.

During all of this, I sought out several opportunities to speak with some of the vendors and attendees about what they do. Several laughed with me about being new to the industry, but they were willing to spend the extra time explaining their jobs and products, and gave me information to read up on as well. The main topic of conversation was the many things you can find in the water out there. I had no clue arsenic can be found in water! I was told out in Nevada they have many problems with arsenic and various other water problems. LeRoy, a chemist, showed me deposit samples which are sometimes found in wells, and explained how these wells have to be treated using chemicals. Another gentleman, Chris, spoke to me briefly about several cases his company is working with to help lower arsenic levels in the water supply. I was also asked to check out the

water results back home. Curiously enough, I will make sure to do that, but will also check out the results for our neighboring towns too. Do you know what is in your water?

We hated missing the skeet shoot, but thanks to Charlie and Deanna we were able to get some photos of the event. There was a great turnout in the continuing education classes, at the vendor social, auction, and banquet. In my opinion at least, I would like to say the auction was a success. Just a heads up though, if Jeremy is ever the auctioneer when you attend, make sure to pay attention. If you don't, I am sorry to say, you will be going home with lots of items unless you have the saving grace of someone to outbid you. Isn't that right, Shelly? It was all in good fun and for a great cause, the scholarship!



UGWA attendees during continuing education classes.

The last day of the convention was full of classes, a general meeting with awards given out and nominations of new board members, lunch, raffle drawings, and closing remarks. I think the convention was a huge success with many attendees getting their continuing education hours in and finding different products or equipment within the diverse group of vendors. We enjoyed capturing the milestones of UGWA, and of course everyone's smiling faces.

In Memory of Howard "Porky" Cutter

I was saddened to learn of the passing of Mr. Cutter. He and I had often communicated over the years. His passion for the well drilling industry was without bounds . . . [private thoughts removed]

I first met Mr. Cutter when he came to Minneapolis a few years ago to check out a drill rig for a client. He took the time to drive an extra 95 miles out of his way to pay us a visit, which was most enjoyable. He had an air about himself that forced a person to like him immediately, and I'm sure many others in the world who met him would agree with me. He will be missed.

Godspeed Porky,
Jim Kuebelbeck

Water Dowser &
WWD Contributing Writer
St. Joseph, Minnesota

Partnership Enhances Drilling Services in British Columbia

Adapted from a Press Release by Tahltan Nation Development Corporation

Northwest British Columbia, Canada, will benefit from a new partnership between Tahltan Nation Development Corporation (TNDC) and Geotech Drilling Services (Geotech). TNDC has benefitted from responsible business and economic development in the region, which has led to job creation, business opportunities, and the partnership with Geotech. Geotech's global, multi-disciplinary surface, and underground drilling operations were a perfect fit for TNDC's service expansion since both parties are based in British Columbia. The partnership will operate as Tahltech Drilling Services, while providing industry-leading exploration, geotechnical, environmental, construction, and geothermal drilling services to both natural resource and industrial development projects in the Tahltan Territory of British Columbia.

TNDC provides a variety of specialized contracting services for building and road construction, forestry, hydroelectric power, and mining industries. They also support operations in administration and accounting, ground transportation, and heavy equipment hauling. TNDC's CEO Garry Merkel said, "Geotech's extensive knowledge, experience, and specialized technology will be extremely valuable to companies operating in [the] Tahltan Territory, ensuring efficiency, accuracy of data collection, and adherence to safety and environmental standards."

Geotech's strength is the technologically advanced techniques and equipment they provide in a wide range of drilling services. "Geotech has long-respected TNDC's efforts toward responsible and sustainable development within the Tahltan's resource-rich territory encompassing some 11% of British Columbia. In conjunction with the entrepreneurial nature of the Tahltan people, Tahltech looks toward a bright future respecting both the traditional values of the Tahltan people and the mission and core values of Geotech," said Geotech President Jody Lambert.

Under the agreed partnership, Geotech will become the preferred drilling company in the Tahltan Territory. It will be a collaborated effort between TNDC and Geotech to secure drilling work on projects in the area, and Geotech will also provide sub-contracting, employment, and training opportunities to Tahltan members. The partnership establishes a mutually beneficial relationship to bring expertise, economic benefits, and a wide range of drilling services to British Columbia.



A work site in the Tahltan Territory of British Columbia.

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water for life

by *Tim Rasmussen*

Aldea Los Paracaidistas is a village of about 550 people just off the main highway a few miles north of Rio Dulce at marker 311. They do not have water, even though in 2012 the government provided a water system and the villagers provided the distribution piping around the area. This system produced water for three months; then worked on and off for a few minutes, and nothing since. Three years ago and no repairs.

The system includes the standard municipal water tower with an approximately 10,000-gallon tank, a 229-foot deep well with 114-foot static water level, a 10-horsepower (hp) pump on three-inch drop pipe, air line, and nice little pump house with chlorine injector. Everything you need for a water system - except water.

Mariano, a man from Canada who is advocating for the village to assist them in getting water, called Bery and asked for help. During the dry months, the villagers are desperate for water. Gary responded to the call to come and look. In Gary's words: "We had traveled in the pickup to look at several sites, so we did not have meters, which are on the pump truck, to check the system. I opened the control panel and smelled burned electrical components, and a small frog jumped out onto the floor. I turned all the controls on, then manually held the contactor in, and the pump ran. We could feel the three-inch pipe turn cooler as the water came up. We have no idea of the amperage, etc., but will return in a week or two and learn that. We will ask the villagers to purchase a new 10-hp, 230-volt, single-phase pump panel because the capacitors are leaking and other components are likely rusting inside from the extreme humidity.



There is a switch with probes down the well, which may indicate a well which won't produce adequate water to keep a 10-hp pump running. Perhaps everything will be fine when we get the controls in order. If the well is drastically reduced because of collapsing clay, we'll drill a small well next year and put a 5-hp pump in it. If it works out okay and they need more water, we'll drill another small well the following year and run them both into the tank. This is a \$700,000 system which is doing nothing for anybody. Water For Life will try and help make this system productive.

If you are reading this and have a heart to help people, and if you are willing to be a little uncomfortable, and want to do something to really help someone, please come and join us. Water For Life changes lives. We now have 89 wells in operation, providing safe water to more than 25,000 people every day. There is a place for you. If you can't come, please support us."

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

Jim

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In Memoriam

Donald James "Don" Wright



Don Wright of Everlasting Springs Water Well in Kirkton, Ontario, Canada, passed away December 28, 2016, in his 62nd year. In addition to being the beloved son of the late Harvey and Evelyn Wright, he was also a dear brother and brother-in-law of Norlene and Ed Rodd, and uncle of Neanna and Josh Catt.

Cecil A. Jeter

Cecil passed away January 31st in Seminole, Texas. He was born October 3, 1932, in Lamesa to Sid Ross and Ruby Shipley Jeter. Married to Dorothy Sirmons on September 26, 1951, Cecil served in the US Army from 1952-1954, a veteran of the Korean War. He owned and operated Jeter Drilling from 1962 to 2007, and will always be remembered as a water well drilling professional. He loved to talk, tell stories, and never met a stranger. He was preceded in death by three brothers and two sisters-in-law. Cecil is survived by his wife of 65 years, Dorothy; two sons Allen (Lori) and Bill (Jan); one daughter Cindy (Ricky); his brother Luther; sister-in-law, Bobbie; 9 grandchildren; 16 great-grandchildren; and numerous nieces and nephews.



Michael Anthony "Mike" Pollice



The Ontario Ground Water Association regretfully reported the passing of Mike Pollice on February 5th at the age of 62. His unexpected passing followed a wonderful weekend of snowmobiling with his son and friends.

Mike founded All-Terrain Drilling Limited in 1979, and operated the company until his retirement in 2008. Drilling was his passion and he cherished the relationships and friendships he made over the years. Mike is survived by his loving wife of 38 years, Sandra, children Sarah (Michael), Jennifer (Brian), and Ryan (Kaitlin). He was also an adoring grandfather for Dominic, Landon, Michaela, Liliana, and Evelyn. He was known to drop absolutely anything to be there for his family and friends. Mike is also survived by his parents Dominic and Dorothy, sisters Patricia, Marianne, and Lisa; brother John, and their families.

Bruce Downing

The Ontario Ground Water Association also had the sad task of announcing the passing of Bruce Downing on February 10, 2017, at the age of 67. Bruce was known for his contagious laugh and wonderful smile. His generosity will be missed throughout the industry, as well as his community.

Bruce was born in Hawkesbury, Ontario, Canada, and grew up in Kilmar. He married Dale and settled in Harrington, where they raised their family and were an integral part of the community. Bruce was an astute businessman and with Dale, Tom, Stephen, and Andrew, built the family business from small beginnings into the successful companies of Downing Drilling and Eastern Ontario Diamond Drilling.

Predeceased by his wife Dale Milway, Bruce was the beloved father of Stephen, Christina (Mark Reece), and Andrew (Alice Wegmueller); proud grandfather to Kathryn, Chloe, and Brielle; and cherished companion of Diane Thibault. He also leaves to mourn his siblings, Edna (Drummond), Richard (the late Nancy), Gordon (Barbara), Tom (Kathy), and Norman (Ellie), as well as many nieces, nephews, cousins, and friends.



David A. Parker



David A. Parker, 54, passed away February 10, 2017, in Orlando, Florida. He was born June 28, 1962, in Townshend, Vermont, the son of Gerald and Rosamond (Leach) Parker. He married Lisa Foley in 1988, and was one of the owner/operators of Parker Water Wells with his nephew Oakley Allen, and his two sons Justin and Adam Parker. He enjoyed hunting with his children, camping, maple sugaring, and spending time with friends, but most importantly, spending time with his beloved grandchildren and family.

He is survived by his mother; his wife Lisa; two sons Justin (Katelyn) and Adam (Alicia); daughter Chelsea; grandchildren Leah, Mason, and Lydia; by his siblings Gerald Parker, Jr., Wayne Parker, Linda Reed, Lorraine Warren, and Kathy Rouse; and also by numerous nieces, nephews, and cousins.

The management and staff of WorldWide Drilling Resource® are saddened to report the loss of these five drilling industry professionals and express our sincerest sympathies to their family and friends.

Lest we forget...

Frequently-Used Geological Terms Part 60

Glossary Adapted from the Dictionary of Geological Terms

O



Coal is an example of an organic rock. *WWD&R* photo of coal samples from Pennsylvania.

Organic Rock - A sedimentary rock consisting of the remains of organisms, either plant or animal.

Oriental Amethyst - The violet to purple variety of sapphire.

Oriental Emerald - A green variety of corundum. The yellow variety is referred to as Oriental Topaz.

Orpiment - A lemon yellow to orange monoclinic mineral. Typically occurs as a deposit from hot springs and as a sublimate from some volcanoes.

Ortho - Prefix which when used with the name of a metamorphic rock indicates it was derived from an igneous rock.

Orthoclase - A white, pink, or gray mineral of the alkali feldspar group. As a common rock-forming mineral, it occurs mostly in granites, acid igneous rocks, and crystalline schists.

Orthogneiss - A gneiss derived from an igneous rock.

Orthoquartzite - A clastic sedimentary rock composed almost entirely of silica-cemented quartz sand. The rock is characterized by scarcity of heavy minerals, lack of fossils, and prominent cross-beds and ripple marks.

Osann's Classification - A chemical system of classification of igneous rocks.

Outcrop - The part of a geologic formation or structure which appears at the surface of the earth. Also refers to bedrock which is covered by surficial deposits such as alluvium.

Outer Core - The outer, or upper zone, of the earth's core extending from a depth of about 1800-3150 miles, including the transition zone. It is presumed to be liquid because it sharply reduces compressional wave velocities and does not transmit shear waves.

Outpost Well - A hole drilled for oil or gas with the thought it will probably extend (by a considerable distance) a pool already partly developed. It is far enough from the limits of the pool to make its outcome uncertain, but not far enough to be called a wildcat well.

Overburden - Loose or consolidated rock material which overlies a mineral deposit and must be removed prior to mining. Also refers to the upper part of a sedimentary deposit, compressing and consolidating the material below.

Look for more terms next month!



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Through the Back Door!

by Jim Kuebelbeck

Water Witching

"The most interesting stories are the ones you've just started to read when the doctor or dentist calls your name."
~ Jim Kuebelbeck

In the early 1800s, U.S. geologists coined the phrase "water witching". It was a term intended to portray all water dowzers as "ignorant and uneducated country folk". The fact certain individuals were able to locate underground water sources at a better rate than some "professionally educated" geologists was somewhat embarrassing to them. In an effort to attempt to discredit or downplay this unexplainable human faculty in the eyes of the general public, the term "water witching" proved to be well chosen. (No pun intended.)

At the time, the famous (infamous) Salem witch trials in Massachusetts in the late 1600s, were still recent history in the public mind, and any reference to witches was met with either skepticism or outright derision. Unfortunately, the term water witching became well-established throughout the United States and persists to the present day. Despite the demeaning term, certain modern day water dowzers continue to successfully locate satisfactory groundwater sources throughout the world. The continuing success of certain particular water dowzers locating good quality groundwater sources in areas where the acquisition of such supplies are often difficult, now makes the term water witching not only outdated, but obsolete. In today's world, many well drilling professionals regularly avail themselves of the services of experienced water dowzers.

Herein lies a problem, however, which exists to the present day, and I often find myself at odds with those individuals who proclaim anyone and everyone has the ability to sense underground water sources by the dowsing method. From my experience and research, I am convinced otherwise. To this day, the failures of many would-be water dowzers continue to bring discredit to the value and credibility of the dowsing method. All too often, individuals have been led to believe any dowsing reaction with any type of dowsing instrument indicates the presence of underground water. Nothing could be further from the truth, and I have expressed this fact to the various dowsing organizations in the United States and around the world (to no avail I might add). I have since distanced myself from these particular dowsing societies and have now become much like the Lone Ranger out here in the flyover unexplored territory of Minnesota!

Although I do believe many individuals can learn to receive a dowsing reaction with some type of instrument, I do NOT believe all humans have the ability to sense underground water sources by the dowsing method. The many failures of inexperienced water dowzers around the world confirm my belief. Human nature being what it is, however, many inexperienced (misguided) would-be water dowzers regularly attempt to demonstrate their newly discovered "ability" by offering unfounded judgment about the presence of groundwater sources. When subsequent drilling proves their predictions wrong, they simply blame the well drilling contractor for "going through the water"! In situations such as these, who can blame some professional well drilling contractors for being reluctant to avail themselves of the services of any water dowser? From my personal experience and observation, I believe it takes years of practice and experience before ANYONE can reliably predict the presence of an underground water source. I would suggest to anyone in need of a satisfactory groundwater supply to be especially wary of the many inexperienced water dowzers around the country who eagerly offer advice about the presence of an underground water source.

*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 **WWD.R.***

Jim

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



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Assisting a Growing Market

Adapted from Information by Vallourec

Geothermal projects are spreading throughout the world, producing more electricity through green energy as a rise in technological advancements take place. Out of the global potential for using geothermal energy, only around 7% of it is actually being utilized; however, the figure is expected to grow fivefold for electricity production and twofold for urban heating by 2030. Vallourec, a leader in premium tubular solutions who primarily serves the energy markets, intends to position itself as a leading partner in the growing geothermal market.

Vallourec will assist Fonroche Géothermie, the leading French company in high-temperature geothermal energy, with the exploration phase of a project focused on underground reserves in Alsace, France, on the site of the former Reichstett refinery and the Eckbolsheim site. The project will involve drilling one or two pairs of injection and production wells, meaning Vallourec will provide 1700-3400 tons of semipremium and premium tubes and connections depending on if two or four wells are drilled. A team of site engineers who can be contacted at any time to go to platforms and install Vallourec products will also be involved to supervise the on-site descent. The drilling of the first well is expected to begin in June. If results are positive, production will start soon thereafter.

This contract follows a similar one obtained last spring for the geothermal plant at Holzkirchen, in Bavaria, Germany, in which Vallourec successfully delivered 1500 tons of tubes. The Holzkirchen power plant whose operation began this year, called for the drilling of two wells to a depth of over 1600 feet. The initial well brings the geothermal water to the surface at a temperature of 280°F (140°C). A steam generator and heat exchanger then uses the hot water to produce electricity and heat. Once cooled, the water follows its loop back down into the calcareous aquifer, descending through the second well. The plant is expected to cover up to 80% of the heating needs for the town of Holzkirchen and will reduce annual CO₂ emissions significantly when compared to the plant's alternative energy source.



The casing and tubing provided by Vallourec are premium steel tubular solutions without soldered joints, initially designed for the oil and gas sector, which are used to consolidate the wells in a gas-tight manner designed to resist harsh conditions -temperatures over 356°F (180°C) and external pressures up to 743 bars. Vallourec is committed to renewable energy, and assisting the drilling industry in procuring the growing energy potential provided by geothermal wells.

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Environmental Monitoring

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



Are You Drilling Efficiently?

One of my favorite sayings is: "You can have your job completed: fast, cheap, or good - pick any two, but you cannot have all three." We could probably add the word "safely" to this list which, in the long run, is the most important aspect of all.

This article is meant to discuss how we can maximize our profits, work safely, and have satisfied clients and employees. This is a difficult juggling act.

I don't pretend to be an expert in any of these areas - except to say I have been involved in the water well and environmental drilling business as a professional hydrogeologist, with the government and in the private sector since 1976. I have spent thousands of hours at sites using the smallest drilling rigs to the largest oilfield drilling rigs. I try to observe what the most successful businesses do to thrive for long periods of time; the following is what I have observed.

Efficiency and Organization - Everyone must have clear responsibilities as to what their job is and how they fit into the

company. Tasks are made clear to each employee and no one person is completely in charge of everything, everyone is responsible for seeing the work continues smoothly and efficiently all the way to the end. Efficiency is defined as working fast and safely. This is accomplished by working as a team, doing repetitious activities quickly, correctly, and safely. Teams who have worked together for a long time know what everyone else is doing and often communicate nonverbally. Efficiently also means doing it right the first time. Redoing one step takes three times as long (undo what you did and redoing it again). Work smarter, not harder; also have the right tools and personnel for the job.

Make sure you are offering a service or product which is needed in your area. What is the most practical and popular type of well in your area? Find out what your product is selling for in your area and price it accordingly. If your price is too low and you are losing money or breaking even, you will be out of business before you know it.

Safety and Employee Satisfaction

Train your employees to work safely, encourage safety - a tailgate meeting every morning is recommended to go over the work plan for the day and hazards to be aware of. Yes, it is possible to work safely, have satisfied employees, work efficiently, and make a good profit while growing your business.

Tom

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

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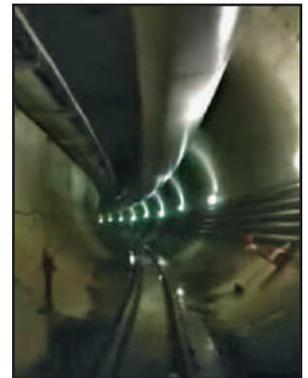
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Construction Completed on the Anacostia River Tunnel

Compiled by the Editorial Staff of *WorldWide Drilling Resource*®

The construction of a tunnel running deep under Washington, D.C., was recently completed by a Salini-Impregilo / Healy / Parsons joint venture as part of the District of Columbia Water and Sewer Authority's (DC Water's) Anacostia River Tunnel Project. It took over a year for a machine nicknamed "Nannie" to drill a 2½-mile-long tunnel, which started at a shaft 12,500 feet from RFK Stadium, home of the Washington Nationals baseball team, and ended when the machine broke through the wall of another shaft at Poplar Point, south



Anacostia River Tunnel, courtesy of DC Water.

Time for a Little Fun!

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

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of the Nationals Ballpark. It's part of a planned 13-mile tunnel network under Washington, which will be used as temporary storage tanks during a storm by holding and diverting water runoff for treatment at DC Water's Blue Plains Wastewater Treatment Plant.

The tunnel boring machine (TBM) weighed about 90 tons, with a diameter of 26 feet. It had to be lowered piece by piece into the shaft near RFK Stadium prior to drilling. The cutterhead is equipped with a system of scrapers which bored through the earth, with the football-field-long (TBM) and trailing gear following behind. Construction crews were always present as they carefully navigated around sensitive sites, utilities, and water mains. As the drill progressed forward, they would line the tunnel walls with cement. For safety reasons, the tunneling system was designed to prevent any sinkholes, inflow of uncontrolled materials, or other issues from occurring.

The tunnel itself is 23 feet in diameter, and was drilled in soft ground primarily in public space. It runs underneath the Anacostia River, the 11th Street Bridge, and other large utilities. In comparison to the Metro rail tunnels, it is larger and actually goes deeper to a depth of 100 feet, even running directly under the Metro's Green Line. Upon completion of the tunnel, workers lifted the face of the massive tunnel boring machine to the surface, which required a special crane counterbalanced with more than 150 ton weights.

The Anacostia River Tunnel connects with a previously completed four-mile tunnel, which ends at the Blue Plains facility. In March 2018, sewage which currently flows from 15 overflow pipes into the Anacostia River will be diverted into smaller tunnels. Before returning to the Potomac River, the sewage will drop 100 feet into the Anacostia tunnel system, and will flow to Blue Plains where it will be properly treated. Another tunnel is expected to be constructed before 2025, which will connect to the Anacostia River Tunnel, in an effort to deal with combined sewer overflow into the Potomac River and other tunnels already completed.



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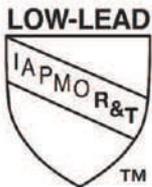
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Water will be the Editorial Focus for our June issue.
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The "Idiots" Corner

by "Billy Bob Smith"

For years, I have wondered about superstitions and their reality or potential. You are not going to believe some of the following, and this is just a very small sample of the thousands of stupid superstitions people live their life by. Guilty?

BEE - If a bee enters your home, it's a sign you will soon have a visitor. If you kill the bee, you will have bad luck, or the visitor will be unpleasant. A swarm of bees settling on a roof is an omen the house will burn down.

BELL - The sound of bells drives away demons because they're afraid of the loud noise. When a bell rings, a new angel has received his wings.

BIRD - A bird in the house is a sign of a death. If a robin flies into a room through a window, death will shortly follow.

BROOM - Do not lean a broom against a bed. The evil spirits in the broom will cast a spell on the bed.

If you sweep trash out the door after dark, it will bring a stranger to visit.

If someone is sweeping the floor and sweeps over your feet, you'll never get married.

Never take a broom along when you move. Throw it out and buy a new one.

COIN - It's bad luck to pick up a coin if it's tails side up. Good luck comes if it's heads up.

COMB - To drop a comb while you are combing your hair is a sign of a coming disappointment.

DOOR - It's bad luck to leave a house through a different door than the one used to come into it.

FISH - A fish should always be eaten from the head toward the tail.

FRIDAY - A bed changed on Friday will bring bad dreams. Any ship that sails on Friday will have bad luck.

You should never start a trip on Friday or you will meet misfortune. Never start to make a garment on Friday unless you can finish it the same day.

FRIDAY THE 13TH - how is fear of the number thirteen demonstrated?

More than 80 percent of high-rises lack a 13th floor.

Many airports skip the 13th gate.

Airplanes have no 13th aisle.

Hospitals and hotels regularly have no room number 13.

Italians omit the number 13 from their national lottery.

On streets in Florence, Italy, the house between number 12 and 14 is addressed as 12½.

Many cities do not have a 13th Street or a 13th Avenue

In France, socialites known as the quatorziens (fourteeners) once made themselves available as 14th guests to keep a dinner party from an unlucky fate.

Many triskaidekaphobes, as those who fear the unlucky integer are known, point to the ill-fated mission to the moon, Apollo 13.

If you have 13 letters in your name, you will have the devil's luck. Jack the Ripper, Charles Manson, Jeffrey Dahmer, Theodore Bundy, and Albert De Salvo all have 13 letters in their names.

HAIR - Pulling out a gray or white hair will cause 10 more to grow in its place.

HAND - If the palm of your right hand itches it means you will soon be getting money. If the palm of your left hand itches it means you will soon be paying out money.

Billy Bob

Contact him via e-mail to michele@worldwidedrillingresource.com

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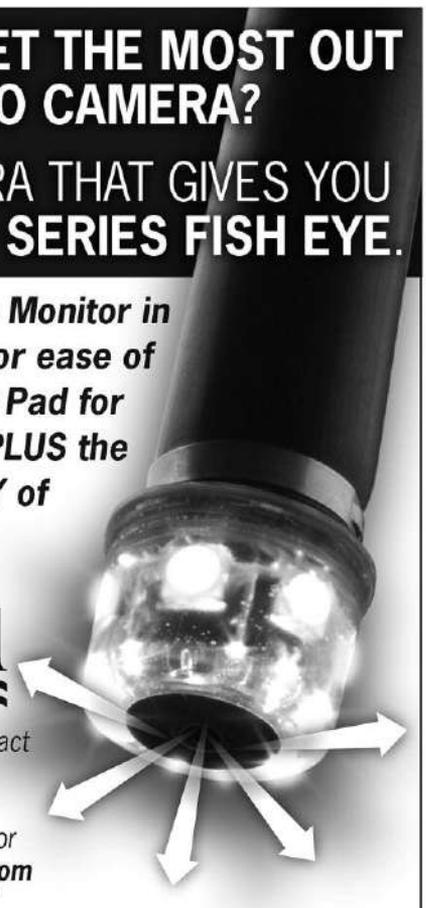
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World's First Commercial Geothermal-Hydro Power Plant

Adapted from a Press Release by Enel Green Power North America, Inc.

Operations have started at the world's first integrated, commercial-scale geothermal-hydro power plant at the Cove Fort site in Utah, operated by Enel Green Power North America, Inc. The Cove Fort binary cycle geothermal well received a fully submersible down hole generator, which resulted in the unique combination of geothermal and hydroelectric power at one site. The initial testing phase revealed the addition of the hydro generator to the geothermal injection well generated an overall increase in output of 1008 megawatt hours between July and September 2016. During this time, the plant's operational efficiency was improved because the increased output was enough to offset the energy consumption of the plant by nearly 9%.

The geothermal well takes water heated by the earth and pumps it to the surface under pressure, where the binary power plant uses heat from the water to generate electricity. Then, the downhole generator in the injection well captures the energy of water flowing back into the earth, thereby generating additional electricity. The likelihood of potential damage to the well is decreased by the generator's ability to create pressure against the flow of water, reducing the flow's turbulence into the well. The result is a world-class innovation, which can reduce operational and maintenance expenses while potentially producing additional revenues.

"The operation of this technology, a world's first, is a major milestone for the geothermal industry and a reinforcement of our commitment to innovation and energy efficiency," said Francesco Venturini, head of Enel's Global Renewable Energies. "We are creating innovative solutions that are making renewable energy better, stronger, and smarter. As a result, we have once again discovered a more resourceful way to maximize plant operations and power generation with the aim of using this technology at our facilities around the world."

With an installed capacity of 25 megawatts, Cove Fort began operations in 2013. It generates up to 160 gigawatt hours of electricity each year, which powers more than 13,000 households while avoiding the annual emission of about 115,000 tons of carbon dioxide into the atmosphere.



*The Cove Fort site operated by
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1981 International F2574 466 8-spd. Eaton, W/SS135 drill rig, IR Model 125-C air compressor, Myers Inc., Deep Rock 8" mud pump; **1981 International F1954** 6x4, SS135 SpeedStar drill rig, no pump or air compressor, Meyer injection; **1995 International 4000 Series** 6x4 water truck, 3000 gallon plastic tank has PTO; **1998 Ford Conventional 'H'** red Ford Louisville National Crane 600C - needs work; **1995 International 4000 Series** cab & chassis 6x2, DT 466 Allison auto, has PTO; **1993 International 4000 Series** 6x4 DT466 Allison automatic double bucket truck, works very good; **1998 International 4700** 4x2 pump hoist; **1995 International 4900** 40x02 185 CUF A/C truck utility; **2003 GMC** pickup bad transmission, 3½x20' 2-3/8 drill rods and more. For more information, terms, and photos, check out our website: belcherauction.com Questions concerning the equipment call Mike Katz at 269-964-9170

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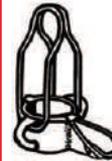
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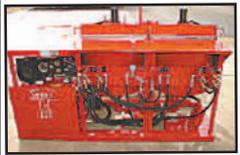
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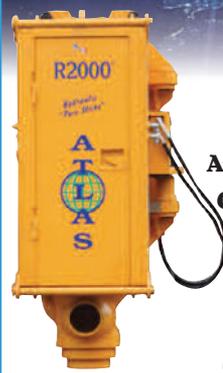
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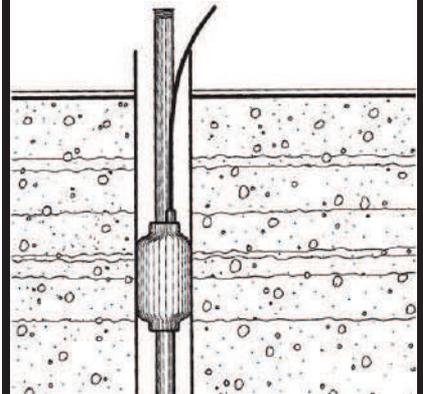
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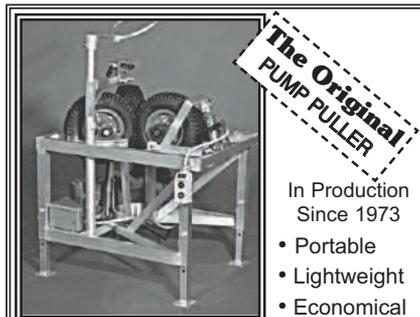
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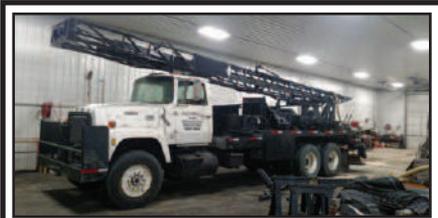


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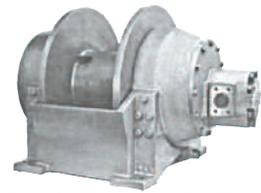
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