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WorldWide

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Our **Solid Gold Service ~ with a Smile!™** is not only a slogan with us, it is our promise to you and is why the **WWD R** Team has the finest people crossing the globe, placing those personal calls, sending those special e-mails out to you, and having so many ways for you to keep up-to-date with your industry - **DRILLING**. It gives us great pride each month to see the final product, and then humbles us when you call, send notes, or e-mails letting us know you enjoyed something or many things in **WorldWide Drilling Resource®**. We thank you.

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The **complete** magazine for the drilling industry worldwide, owned by drilling industry associates dedicated to bringing the most up-to-date technology and information to subscribers. Covering **construction-geotechnical, directional, environmental, exploration-blasthole, shallow gas & oil, geothermal, mining, water well, irrigation, wastewater**; from bits, to pumps, to rigs, to tanks, through wire and more - **whatever it takes to get the drilling job completed!**

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What a Show!

by Ed Moranski, Chief Marketing Officer, *WorldWide Drilling Resource®*

The Empire State Water Well Drillers Association (ESWWDA) held its annual winter meeting January 16 - 17, 2018, at the Turning Stone Resort Casino in Verona, New York. One thing is for certain, bring your boots because you are going to get snow, and this year was no exception. Day one was filled with educational seminars. Henry Boyd had an overflow crowd for his *General Knowledge / Drilling Certification Primer Course* which included many young and next generation drilling professionals getting their education from the seasoned rig master.



Henry Boyd

No association gathering is complete without a meet and greet social event and auction. If you missed this one, you missed one of the best. Once again, auctioneer Jeff Quinn delighted us with his comical anecdotes and general gibberish to the delight of the crowd.



Jeff Quinn

On Wednesday, during the ESWWDA General meeting, Jeff More from the Accord Group and lobbyist for the Water Systems Council, brought everyone up to date on happenings in Washington. He has a wealth of information and is a valuable asset to the association. We were also introduced to the new NGWA (National Ground Water Association) CEO Terry Morse who gave us a brief vision of what he would like to accomplish. Rounding out the presentations were Paul Quirk past president of the MGWA (Michigan Ground Water Association) and Mark Glaser from Greenburg Traurig.



Jim Wild and Walter Wyckoff

Outgoing President Walter Wyckoff handed over the gavel to new President Jim Wild, and the membership (at Walter's expense) thanked him for his service.

Attendance was strong, the educational sessions and speakers were good, and all in attendance had a great time.

Why is it some association's trade events are growing and getting stronger, while others are struggling to stay afloat?



Members thanked Walter by razzing him about his iconic beard. *WWD R* photos.

To see all the photos from this event, go to www.worldwidedrillingresource.com or click [here](#).

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Drilling Into Money Not Boring

by Mark E. Battersby

Taxing Pass-Through Income ~ or Most of It

Pass-through business entities, drilling businesses which don't pay taxes, but instead, pass income (and losses) onto the personal income tax returns of their owners, have long been extremely popular. In fact, S Corporations are currently the most-used entity with limited liability companies (LLCs), the most frequently chosen. However, thanks to the recently enacted "reforms" under the Tax Cuts and Jobs Act (TCJA), pass-through owners might face higher tax bills, prompting many to consider the basic 'C' Corporation for their operations.

S Corporations, LLCs, partnerships, and sole proprietorships, even those paying no wages, can now deduct 20% of their income below \$315,000 (half this amount for single taxpayers). For income above this level, the 20% deduction remains - but only for "business profits," creating a top effective tax rate of 29.6%.

To apply the wage and capital limitations, the new law imposes on pass-through owners earning more than the threshold amount, it is first necessary to calculate 20% of the qualified net business income - for each separate business activity.

The next step requires selecting the higher of one of two factors. Factor one equals 50% of the wages paid and deducted by the drilling business. Factor two consists of the sum of 25% of business wages and 2.5% of qualified unadjusted property. Once the greater of these two factors has been determined, a drilling professional uses the lesser of the wage and capital limitation, or the percentage of business income factor as their deduction.

Qualified property is defined by our lawmakers as tangible property subject to depreciation which is held by, available for use in, the qualified trade or business at the close of the taxable year. Wages paid by the drilling operation or business refers to all wages, including wages paid to employees of the business.

Clear as mud? After all, with rules which disallowed fringe benefits and demand reasonable compensation for pass-through drilling businesses, why would anyone want to operate under those rules when they could easily pay tax at the new 21% corporate tax rate and deduct fringe benefits.

Because S Corporations attempting to convert to regular 'C' Corporation face new rules under the TCJA, professional guidance is obviously needed, especially when attempting to decide which type of business entity is right for the drilling operation - and which will produce the lowest possible tax bill under the TCJA.

Mark

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



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Hot Off the Press

2018 Anniversaries

Broco, Inc. and Rankin Industries, Inc. are proud to celebrate milestone anniversaries this year. Broco marks 50 years of leadership and innovation in the underwater, tactical, and industrial cutting and welding industries; while Rankin celebrates 80 years of design and formulation of superior buildup and hardfacing products for maintenance and repair industries worldwide.

Broco was founded in 1968, as a small company working on a handful of government contracts and underwater projects. As regulations and technology advanced, so did Broco, resulting in the world-renowned "the original" Broco Exothermic Torch and Cutting System.

In the last two decades, Broco expanded with a tactical line of rescue, repair, and forced entry tools for law enforcement and the military which are now used by agencies around the world.



Rankin Industries dates back to 1938, when it began manufacturing welding consumables. In the 80 years since, new formulations were developed utilizing special elements and alloys. Rankin offers a wide range of hardfacing and buildup products designed to protect and extend part life of expensive equipment against abrasion, corrosion, impact, temperature, and wear.

Rankin's Protective Metal Alloys line of nickel-based and nickel-tungsten hardfacing and buildup products also celebrates 40 years in 2018, and Rankin Automation's automated welding systems product line marks its 30-year anniversary.

"We are looking to the future and how best we can serve our industries, business communities, our customers, and partners," said Richard Ferry, president of Broco Rankin.

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Robit Celebrates New Production Facility in South Korea

Adapted from a Press Release by Robit Group

Robit Plc held a grand opening ceremony for its new production facility in Hwaseong, Gyeonggi-Do, South Korea. Harri Sjöholm, Robit Plc's chairman of the board said, "Korea has been a really positive surprise for Robit. Korea has been an excellent place for manufacturing drill steels. Therefore, it was easy to make the decision for the new investment. Robit has manufacturing units in Finland, UK, USA, and Australia. Out of these, Korean unit was clearly the best unit last year. I want to thank our Korean team for the excellent work."

The new facility will be able to meet the growing demand for rods and shanks of the company's top hammer product line. In addition, the turnaround time will be significantly shortened, improving the delivery capability and service level to customers. The new production facility has been built close to Seoul, which also improves logistical connections.

The Hwaseong production facility is one of Robit Group's six manufacturing plants, each having its own focus to ensure availability of products and services, while enabling efficiency and future growth. The company has top hammer production lines in Finland and South Korea, as well as a down-the-hole production line in Australia, UK, and USA.



The Un-Comfort Zone II

by Robert Evans Wilson, Jr.



Bottom-Up Innovation Starts with Top-Down Commitment

A few weeks ago, my son shared a story with me that was just the sort of case study I was seeking for an article on bottom-up innovation. As it turned out, Contributing Writer Britt Storkson related the same toothpaste factory story on page 39 of the January 2018 issue of *WWD*.

The conclusion to the story was obvious: If the company had consulted the factory line workers first, they could have saved millions of dollars. A consultant's motivation may be to make more money from a complex solution. A commonsense solution, a low-tech "simple solution" is more likely to come from someone who is closer to the problem on a daily basis. The question is, how do companies go about getting ideas from their everyday employees?

First, I want to note I diligently sought the origin of the story and the name of the toothpaste company, but all I could dig up was Snopes reporting it as a legend. Nevertheless, it still depicts realism because there are many stories like it. Sometimes the downline suggestion or idea is appreciated, but many times it isn't.

Here's one reported on Reddit.com in 2014 by kaosChild: "I worked at an aluminum products company while I was a student, on part of a machine production line. The machines jam fairly frequently and, in order to stop it on this particular day, I found a way to [fasten] a 4"x4" piece of cardboard to a belt that made the machine run perfectly. My supervisor came after several hours and got mad at me when she saw the mod (modification) and took it out. The machine promptly went back to jamming every three minutes, but policy was that people can't do that sort of thing. I understand some people might come up with bad mod ideas, but when the machine jams, it spits out aluminum shards that do occasionally end up in the product. My production went down, my quality went down, the amount of unjamming I had to do went up."

Here are two stories where the ideas were valued: the Swan Vesta match company was looking for a way to save money, when a frontline employee suggested they remove the striker strip from one side of the matchbox. The idea was implemented and millions of dollars were saved. At the El Cortez hotel in San Diego, originally built in the 1920s, a bellboy during the 1950s suggested they add an elevator to the outside of the building. The idea was applied and the hotel built the world's first glass-walled exterior elevator which immediately became a sensational attraction.

Unfortunately at many companies, ideas and suggestions get shot down, ignored, or worse - punished! Yet those same companies claim they want new ideas to improve the bottom-line. In today's competitive world marketplace, all companies need new ideas. The solution is creating a culture of innovation.

For a culture of innovation to succeed, employees - all down the line - must believe the company appreciates their intelligence, resourcefulness, and creativity. They also must believe the company wants and values their ideas. Without these

factors, a company will not be able to generate the stream of ideas they need to stay competitive.

There also needs to be a system for suggesting ideas, along with a system for testing and implementing them. The system needs to acknowledge and reward those suggestions - even if they are not accepted or utilized. Employees are motivated to contribute their insights if they see their ideas are taken seriously. If they are not, then the flow of ideas will stop. People naturally seek out ways to save time and materials, as well as other efficiencies, and if encouraged, they will share these observations with management.

Toyota is a good example of a company with a successful culture of innovation. The average Toyota employee makes over 100 improvement suggestions every year. With thousands of employees, it adds up to millions of ideas, which has made Toyota one of the most successful automobile manufacturers in the world.

Amazon rewards its employees for an idea - even if it fails - if they have put time and effort into developing the idea.

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Wilson cont'd on page 20.

BREAKING NEWS

Top Ten Finalists for Family Business Award Includes Royal Eijkelkamp

Congratulations to Royal Eijkelkamp for being nominated for the Netherlands' Family Business Award 2018. With 500 Dutch family companies registered for this prestigious award, to be named as one of the ten finalists is exciting. Later this spring, a professional jury will select the winner.

Foundation Familie Onderneming grants the Family Business Award every year to an excellent family business from the Netherlands. The foundation, founded in 2012 by entrepreneur John Fentener van Vlissingen, is dedicated to supporting Dutch family businesses.

In addition to meeting the prerequisite of being a real family business, the nominated companies are judged under eight criteria, including growth, innovation, internationalization, and social involvement.



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WHO'S IN THE NEWS



Mobile Drill Intl. (MDI) welcomes Tom Wardell back to the company as Territory Manager for the Great Lakes and Southeastern U.S. region. He will be providing customer service, developing new business opportunities, and creating solutions to customer needs. In addition to starting his career with MDI, Tom is a well-known and respected figure in the industry with over 22 years of experience.

"I look forward to being back at MDI where I can build upon my relationships in the drilling industry and contribute to the continued growth of the company," Tom stated.

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

Additional announcements from the American Petroleum Institute, Industrial Scientific, and Flint & Walling are located in our online issue: worldwidedrillingresource.com

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Through the Back Door!

by Jim Kuebelbeck

Colorado

You guys did what? You're kidding me. You bought a piece of property on top of a mountain in Colorado, and you're planning to build a house up there? Are you serious?

Those were the first thoughts entering my mind some months ago when one of my daughters called to tell us she and her husband had just purchased a seven-acre plot of land high up in the mountains near Evergreen, Colorado. Before I had a chance to respond, she said to me, "Dad, you have to see the place. It's beautiful. The scenery is absolutely awesome!"

"So this is right on the top of a mountain?" I asked.

"Yes it is, but there's a tarred road almost all the way to the property," she replied, explaining the rest of the road was of good gravel. I then asked how close it was to a town, what kind of a water supply was there, and if it had city water.

"Well, Dad. That's what I want to talk to you about," she said. "There are only a few homes in the area, and they all have water storage tanks in their homes because it's hard to find a lot of water up there, but no, there is no city water up there." I asked what kind of wells these other homeowners have, and she told me the wells in the area near their property are 600-700 feet deep, produce only a gallon or two a minute, but with a large storage tank, they say they never have a problem! Then she added, "We know there's a problem finding a good water source up there, but the realtor told us about it right up-front, but because of that, before a building permit is granted, anyone building a home up there is required to drill a well first, and then a building permit is issued only if the well produces at least one gallon a minute. I think the banks and mortgage companies came up with that requirement."

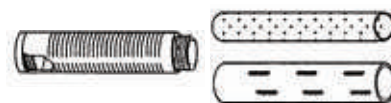
I couldn't believe my ears! In a modern home, relying on a gallon a minute definitely seems to me to be a disaster waiting to happen. I asked what they were going to do with their property if they couldn't find a good water supply, and that's when she dropped the second little surprise on me! "Dad," she said, "that's why I'm calling you. We want you to come out to Colorado to find us a good water supply. We'll pay for your flight out here. We just talked to a well [drilling contractor] and he suggested we try to find a good water dowser because a lot of dry holes are drilled in this area, and that would put the odds in our favor. I told him about you, and he said he had heard or read about you somewhere, and was certainly willing to work with you."

I told her maybe they should just pick a place to drill and take their chances. "Dad," she reminded me, "You never tell people to drill at random! We want you out here!"

"Jane, just how high up on this mountain is your property?" I asked. She said it was about 7500 feet, and I couldn't believe they wanted me to try to locate water where maybe there isn't any! I told her we'd think about it, but this was one time I had



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some serious misgivings about traveling out of state, and offering judgment about an underground water source - especially to my own daughter! After talking to Carol, we finally agreed to travel to Colorado and try to help them. They paid for our flights and we flew out to Colorado in September.

Arriving at their proposed building site, it was quite evident "top of the mountain" was in no way an exaggeration. The property was located on what appeared to be a narrow peninsula, jutting away from the top of the mountain, with three sides of the property dropping down steeply toward the mountain valley far below. The only possible place on which to build was limited to a small area. I suddenly wished I were back home in my workshop! That not

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Kuebelbeck cont'd on page 26.



The Transistor: A Simple Concept that Changed the World Forever

by **Britt Storkson**
Owner, P2FlowLLC

Many people think the most profound inventions of the 20th and 21st centuries are something really complex, something people have spent years and years developing, resulting in reams and reams of documents about the invention. Often though, the most significant inventions are the simplest ones.

What is widely considered to be the most impactful invention of the 20th century? It's the transistor. What does a transistor do that's so great? A transistor has three terminals: the base, the collector, and the emitter.

When an electrical current is applied to its base, it allows current flow from the collector to the emitter. When the base current is taken away, the current flow stops. (See illustration.) It can "switch" the current flow on and off. This is all it does.

It doesn't seem like much, but it's a really big deal. Transistors are much faster than mechanical switches. Basically, transistors don't wear out. Often, they are much less expensive than mechanical switches. Like everything, they do have limitations and must be selected to service the application for good performance and maximum life, but transistors are not going away anytime soon. They're that good.

The word "transistor" is derived from two words: "trans" = moving . . . like the word transportation . . . and "istor" which is the tail end of the word "resistor". A transistor is a moving electrical resistance. It can either be a very low resistance (but never zero) or a very high resistance depending on the amount of current applied to the base. This makes it possible to do all sorts of things.

Transistors have many applications, and detailing everything a transistor can do is beyond the scope of this article. However, one major application for a transistor is amplification. A small current at the base of the transistor controls a much larger current flowing from the collector to the emitter. Small currents applied to the transistor base can control much larger currents (or voltages) flowing from the emitter to the collector. The concept is much like a small rudder controlling a big ship, or a small bridle and bit controlling a large horse. Small changes in the control end can result in big changes in the operational end.

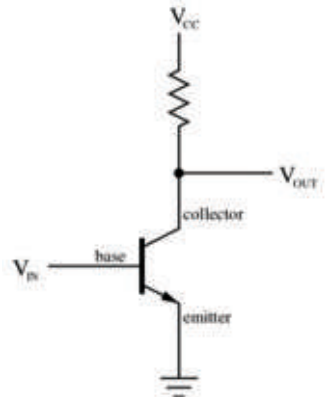
There are many advantages to this kind of operation. With the microprocessors I use, I can do all of the computational operations using very small amperages . . . like micro (millionths) or nano (billionths) of an ampere and, when I'm ready to output the result, output to the base of a transistor which drives a much higher amperage device like a light or a motor.

The reason for this, like most everything we do in industry, is cost. Low-amperage transistors cost less to make than high-amperage transistors. To keep the product cost low, we use only the material needed to get the job done. So if you have a low-amperage application, you use a low-amperage transistor; likewise, if you want to control a higher amperage, you use a transistor capable of doing it.

It's a good practice with any product development to closely match the components to the application they are to service. One should not overbuild things and add to the cost, and likewise, one should not underbuild things as this would reduce product performance and reliability. The result is a product which is adequately reliable, but not overly costly for the customer, as well as profitable to manufacture.

Britt

Britt Storkson may be contacted
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2015 Rule on Hydraulic Fracturing on Federal Lands is Rescinded

Adapted from a Press Release by the U.S. Bureau of Land Management

The U.S. Bureau of Land Management (BLM) has announced its final rule to rescind the 2015 final rule entitled, *Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands*. The 2015 rule was intended to ensure wells were properly constructed to protect water supplies, fluids that flow back to the surface as a result of hydraulic fracturing operations were being managed in an environmentally responsible way, and provided public disclosure of the chemicals used in hydraulic fracturing fluids. To achieve these goals, a long list of requirements were to be imposed on gas and oil operators. However, the rule was actually never placed in effect since it was immediately challenged in court.

On March 28, 2017, President Trump issued an Executive Order directing the Secretary of the Interior to review four specific rules, including the 2015 rule, to make sure it was consistent with the order's goal of promoting clean and safe development of energy resources, while avoiding "regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation."

While reviewing the 2015 final rule, they discovered all 32 of the 32 states with federal gas and oil leases have regulations addressing hydraulic fracturing, and a lot of the regulations would have been duplicated with the 2015 rule. They also realized that since the 2015 final rule was published, more companies were using state regulatory agencies and/or databases such as FracFocus to disclose the chemical content of hydraulic fracturing fluids. The review included an evaluation of state laws and regulations.

Seeking a way to reduce the costs of regulatory compliance, the BLM published a proposed rule to rescind the 2015 final rule, last summer. Rescinding the rule, returns the affected sections of the Code of Federal Regulations to the language which existed immediately before the 2015 rule (except for changes made by other rules/definitions published during that time).

According to the BLM, approximately 1700 production wells were, or would be, drilled in 2017 on federal and Indian lands. Of those wells, roughly 90% were completed using hydraulic fracturing to stimulate production. Combined with the significant technological advances in horizontal directional drilling, hydraulic fracturing is frequently used to access previously inaccessible resources of gas and oil in tight shale formations across the country.

The BLM estimates rescinding this final rule will provide a reduction in compliance costs of around \$9500 per well or approximately \$14 - \$34 million per year.



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Environmental Monitoring

by Thomas Kwader, Ph.D., PG



Well Water - The Preferred Choice

Our drinking water may come from a variety of sources, depending upon where we live. Most of us do not really have a choice in water sources, especially if we hook-up to a public water system (PWS). Most public water systems rely upon wells and/or surface water as their primary source of water.

Groundwater from wells is often preferred (if there is an option) due to the reliability of groundwater as a sustainable supply. Groundwater usually has a consistent quality, temperature, and protection from contamination if the aquifers are deep and overlain by low-permeability strata (clays, marl, etc.). Also, the drilling for groundwater, from a quality and quantity standpoint, is usually well-known for a given area based on previous drilled wells. Most groundwater usually meets drinking water standards and does not require treatment except for simple chlorination, or on rare occasions, removal of iron and/or hydrogen sulfide. Also, a well requires a very small "footprint" and can be conveniently located on small parcels of land.

In rural areas where there is usually a low population density, the preferred choice is individual or private wells. These wells are relatively expensive for an individual homeowner, depending upon the depth and diameter. Many small towns and municipalities use surface water as a primary source of potable water. These water supply systems are often located on large lakes or rivers, with a capacity to supply thousands to millions of customers. On rare occasions, a surface water supply could be compromised by a chemical spill, fish-kill, or bacteria-related issue, therefore careful water quality monitoring is necessary to provide a safe potable supply. Other water supply sources include cisterns which collect rainwater off roofs and other impermeable surfaces. These systems were more popular a hundred or more years ago when wells were less common.

Wastewater treatment plants have made great progress in cleaning up and reclaiming many types of wastewater, but this water is mostly used to supplement water used for cooling purposes or irrigation (golf courses), and generally not for human consumption. A disadvantage and serious concern of both groundwater and surface water supplies is contamination. Once groundwater or surface water becomes contaminated, it may take a very long time (years) and incur considerable cost to remediate to drinking water standards. Surface water may clean-up faster if there is significant flow through the system.

Probably the fastest growing source of potable water usage is coming from reverse osmosis (RO), where salts and minerals are removed from brackish water sources. RO consists of filtering the salts and minerals using micropore size filters and high-pressure pumps. Advances in this type of treatment are expected to grow in usage, especially in coastal areas.

Tom

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

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Rail Line Extension Project Examines Underground Features

Adapted from Information by Mernda Rail

In Australia, the Victorian Government is extending the South Morang train line to Mernda in an effort to provide for the significant population growth in Melbourne's north. The majority of the rail will be constructed at ground level, with less than 14% of the entire track running on an elevated structure.



The extension will be almost five miles long and involve dual tracks, which intersect five roads along the corridor. To aid in the design of the train line, geotechnical investigations, environmental studies, and technical surveys were undertaken.

Geotechnical investigations are needed to test the types of geological features beneath the ground, which in the case of the rail line could influence the design and construction methods of the project. A rig mounted to a truck successfully drilled boreholes to a depth of nearly 70 feet. Core samples were analyzed in a laboratory to provide information about existing underground conditions of the soil, rock, clay, and sand. Roughly 50 groundwater monitoring wells were installed to measure the depth of the natural groundwater levels and determine its quality.

During the geotechnical investigative process, ground-penetrating radar and nondestructive digging techniques confirmed underground service depths like gas,

power, water, electricity, and communication installations. Confirming the locations of these services influenced the design of the rail, but it also ensured the project would avoid causing damage to any of the infrastructure. Any area disturbed during the process was restored to its original condition upon completion of the work. In some areas, a small monitoring well cap was left at the borehole to allow for further testing over time.

Since the water table varies along the route, excavation work in some areas with deep water table levels will be completed above the water table, which will avoid the need to continuously dewater the trenched area during the rail's construction and operation. In almost every location, basalt rock was encountered, so special excavation equipment will be required to excavate through these hard layers and will take longer to complete than excavating regular soil, sand, or clay. Existing topography will also cause portions of the rail to be constructed under the road at certain places. The new rail line is expected to be operational by 2019.



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Wilson cont'd from page 12.

This is a concept which has driven Amazon's explosive growth.

To generate bottom-up innovation, there must be a top-down commitment from company management to maintain a culture of innovation. Without the commitment, it just won't work.

Robert

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

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



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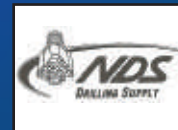
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In Memoriam

William J. "Bill" Lawson, Jr.



The management and staff of **WWD** was saddened to hear of the passing of William J. "Bill" Lawson, Jr. on January 12, 2018.

Bill was a former U.S. Marine who served during the Vietnam War. Since 1980, he and his wife Pat owned and operated Altantic Screen Manufacturing, Inc. in Milton, Delaware.

He is survived by his wife of 47 years, Pat; son Jeff and wife Shannon; grandchildren Owen, Colin, and Brenna; three brothers, a sister, and other extended family. Contributions may be made in Bill's memory to Hebron MP Church, c/o Mrs. Nellie Adams, 21902 Vaughn Rd, Georgetown, DE 19947.

Dean E. Rickard (1956~2017)



The Wisconsin Water Well Association sadly relayed the passing of member Dean E. Rickard on December 6, 2017, following a brief illness.

Born in Dodgeville, Wisconsin, Dean joined his father at Rickard Well Drilling after high school. In 1978, he purchased equipment from his father and started Dean Rickard Well Drilling. Dean sold his company to Sam's Well Drilling in 1998, then worked for them until his death. He was respected for his honesty, knowledge, and skill, and worked hard to do a good job to serve the citizens of his area.

Building models of well drilling rigs and collecting toy construction equipment were Dean's hobbies. His greatest joy was time spent with family and friends, especially summers by the swimming pool.

Dean is survived by his wife Wendy; children Jason (Rejona) and Kimberly; three grandchildren; and extended family.

Thurman "Anthony" Dale Watts (1983~2017)

Tragically, Thurman "Anthony" Dale Watts of Harts, West Virginia, passed away December 29, 2017, as the result of a dozer accident at a mine in Fayette County. He enjoyed working in strip mines, and volunteered at the fire department.

Anthony is survived by his son Wesley; sister Julie (Orla); parents Roger and Darlene; and other extended family.



The management and staff of **WWD** express their sympathies to the family, friends, and colleagues of these gentlemen.

Lest we forget...

What is Horizontal Directional Geotechnical?

Information Provided by Mears HDD

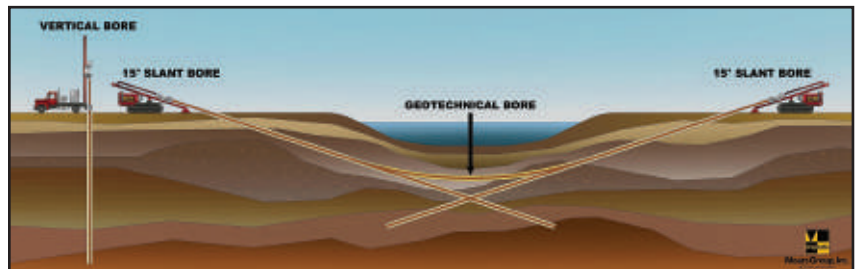
All horizontal directional drilling (HDD) projects have to contend with unknown geological conditions, and getting through those conditions can be one of the greatest challenges. Mears HDD out of Houston, Texas, has developed a patent-pending solution which uses a geotechnical process to determine the soil conditions while completing the pilot hole drilling.

Known as horizontal directional geotechnical (HDG), this process allows operators to reduce costs by shifting the pilot hole phase into the planning and feasibility phase of a project.

The company uses its team of geologists to analyze samples and data from each project

to determine specific conditions. The data and collected information is used alongside real-time drilling performance reports to make adjustments to the pilot hole path. The contractor is then able to assess the data and select the proper down hole equipment to complete the reaming and pull phases.

The HDG process can be completed with a smaller rig and labor force than what is typically used during the pilot hole phase, further reducing cost. With this process, the contractor also has the ability to recover core samples from the borehole, allowing them to obtain the exact type of reamer needed for the specific project.



The Evolution of Air Compressors in the Drilling Industry

by Michael Sagerman, Factory Product Manager - Portable Compressors
Construction Equipment North America LLC

Diesel-driven portable air compressors have long been an integral part of the drilling industry, whether in the domains of the gas and oil sector, mining, or potable water drilling. Given the task of drilling has become increasingly complex given the many special parameters and restrictions, so too has the complexity and importance of selecting the right air compressor.

Equipment dealers, such as Ring Power Corporation in Florida, have significant capital invested in high-pressure, between 365-500 psig (pounds per square inch gauge), discharge air compressors servicing the air drilling industry. They also have the knowledge and resources to guide and help drill operators to making the right compressor choice.

Air compressors have evolved from simple mechanical pneumatic-controlled with analogue gauges, to sophisticated integrated electronics in both engine and compressor controls, LED touch screen displays, and innovative new features to improve productivity while reducing overall operational costs. Recent feature developments include FuelXpert™, Oiltronix™, and most recently DrillAir Xpert™, each targeting the optimization of efficiency, maintenance, and productivity.

More than 75% of an air compressor's total cost of ownership is operational diesel fuel. FuelXpert™ is a combination of unique hardware which regulates engine speed and air inlet with a view to optimizing fuel consumption for each working condition. Most importantly, when the air demand is lower than the capacity needs, the system ensures the right capacity for the application. The result is 10% better fuel consumption than conventional systems.

Oiltronix™ safeguards the compressor element while extending oil lifetime by measuring numerous ambient and operational parameters to regulate compressor oil injection temperature. Two significant gains:

1. Hot/humid conditions - maintains oil temperature above dew point, removing moisture (1% water in compressor oil reduces compressor lifetime by 40%)

2. Cooler/dry conditions - lowers compressor oil temperature by 50 degrees to double the lifetime of both the compressor element, as well as the compressor oil.

Finally, more recently, DrillAir Xpert™ variable regulating system, providing operators greater control of on-demand pressure and flow settings. For example, Ring Power's fleet is largely multipressure units providing 1550 cfm @ 365 psig and 1350 cfm @ 508 psig. The drill operator can select either flow/pressure setting and choose either pressure regulation (PR) or flow regulation (FR). PR maintains constant set pressure and decreases flow the deeper you drill - typically used in traditional drilling applications and where water table back pressure is encountered. Conversely, FR maintains constant set flow rate and the pressure increases the deeper you drill - primarily used with borehole collaring, borehole flushing, and in-hole caving control.

Control interfaces have evolved, providing broader data access and information via scroll-through screens, on operational condition, performance, and deviations of both the compressor and engine sides. Any parameter outside the prescribed limits, prompts on-screen and audible warning, guiding the operator to the point needing investigation. The days of trial-and-error troubleshooting are virtually gone, with more than 500 line items of data at your fingertips. Also, prescribed maintenance cycles are programmed within prompting when a timed service is necessary, making service planning more efficient.

New features, especially those more technology-based, must come with benefit, otherwise they bear zero value and drill operators expect a return on investment. Ring Power is ready to supply best-in-class 1550 cfm high-pressure compressors for sustainable productivity in the drilling industry.



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Tales from the Field

by **Jeremy C. Wire**
Geoconsultants, Inc.



The Lady with the Checks

Sometimes, incidents in the field are so unusual and out of the ordinary, but not necessarily in a dangerous or life-threatening sense, they are recalled from time to time, particularly when passing by the location where the incident happened. In this case, a field project involved the excavation of test pits with a backhoe to shallow depths of 15 feet at various locations on a piece of property. The purpose was to develop soil profiles and check for the occurrence of shallow groundwater which might affect the operation of septic disposal systems for a proposed residential development.

The work was going smoothly as far as operations in the field were concerned. However, during the day, we noticed a lady in one of the neighboring homes kept peering out her back door. We observed this occurrence about every hour or so, but she didn't say anything to us, and we figured she was either just curious about what was going on, or was bothered by the noise and was being too polite to complain. Accordingly, we didn't pay too much attention. We left several test pits open during the day to see if any shallow groundwater would seep in, which did not happen, and we were ready to backfill them by later in the afternoon.

During the backfilling one of the test pits, we saw the lady who had been observing us all day coming toward us, pulling a child's wagon heavily loaded with something we quite couldn't make out. As she got closer, we could see there were several boxes in the wagon which were obviously heavy. Arriving at the edge of the test pit, she said, "I have all these cancelled checks in these boxes, and I need to get rid of them. Do you suppose it would be all right if I just dumped them in and you buried them in this pit?"

An unusual request to say the least! Our crew looked at one another for a moment, but before we could reply to the question, she dumped the first box, with hundreds of cancelled checks, probably originating from some long-gone business, falling into the bottom of the pit. After a moment of stunned silence, we all agreed the paper would probably eventually decompose and shouldn't be hazard, so the other boxes of checks were dumped in and soon covered by 15 feet of soil backfill. Considering when this incident happened, "shredding" all that paper was not a readily available option. So, burial in the test pit was probably not a bad solution to her problem, as thought of by this "lady with the checks".

Jeremy

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

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Kuebelbeck cont'd from page 15.

being the case, I had no choice but to try to see if I could find something, rather than nothing.

To my surprise, I did manage to locate what I thought might be a live water flow beneath the surface, but I had never worked in the mountains before, and I had some serious second thoughts about giving advice under the circumstances. (Minnesota doesn't have mountains.) After seeing some of the local sights, we left Colorado three days later, not knowing if dowsing in the mountains would be as successful as dowsing in other parts of the country.

Three days later, we received a call from one excited daughter and son-in-law, telling us the greatest well had been drilled on our selected site. It is producing over 25 gallons per minute! The contractor told them it was one of the best wells he had ever drilled on the mountain, and then added, "You have so much water you could sell water to all of your neighbors!" (Their nearest neighbor has a well that yields only one-and-a-half gallons a minute.)

Our daughter and son-in-law came back to visit recently, and told us their neighbor had approached them and asked if they might be able to somehow tap into their water supply if there was ever a wildfire on the mountain! Unbeknownst to the neighbor (who wasn't home at the time we were out in Colorado), I dowsed around their property also, in the area where they had drilled their deep marginally productive well, but found nothing I would have selected as a site to drill a good water well. Needless to say, our daughter and son-in-law are now very happy people (as are we).

*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**.*

Jim

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



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Accurate Alignment! *Adapted from Information by Minnovare*

A tunnel project in Hong Kong, China, required the assistance of Minnovare - a company with a desire to improve the overall productivity of exploration drilling within the mining industry. The project utilized Tube a Manchette (TAM) grouting, which offers an efficient, cost-effective means of grouting for foundations, tunnels, and mines. The system involves drilling holes, and filling them with a length of pipe, which is then filled with cement grout. The accuracy of the drilled holes is critical to ensuring the effectiveness of the grouting, and by extension, the reliability and safety of the project.

Prior to contacting Minnovare, the client had planned to employ traditional land surveying techniques which would result in extended rig setup times with up to two hours of downtime per shift. Faced with a tight schedule, the costs of not getting the project done on time were high, as well as additional costs of employing a team of land surveyors and technicians. To make things even more challenging, the drill rig had to be raised up and down on a mobile platform, which in itself was a major safety concern for drill operators.

Minnovare's Azimuth Aligner (AA) is an accurate drill alignment technology. The level of accuracy it can provide eliminates the costly and timely process of redrilling. Drill rig setup times are also significantly reduced, meaning the entire process can be completed within five minutes. Setup includes preprogramming the AA, attaching the unit directly to the drill rod, then drilling.

During the first shift of using the AA on the tunnel project, drill hole deviation and subsequent redrilling due to inaccurate rig setup was eliminated, resulting in a 30% increase in drilled feet per shift. Drill rig setup times were reduced by 90%, which kept the project on schedule, and significantly reduced reliance on surveyors and technicians. This removed costly overheads and increased safety by having less hands-on involvement required at the drilling platform.



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Overseas Travel Management

by Ashish Rath

National Sales Manager, Shakti Pumps USA LLC

Food and Drink

Many infectious diseases (e.g. cholera, hepatitis A, B, and E, listeriosis, and typhoid fever) are transmitted by contaminated food and water. The local standard of safety depends on how food and drink are prepared and handled. Some simple precautions can reduce the risk significantly:

- Don't eat it if you don't know what it is.
- Ask someone before eating what it contains, especially if you are allergic to something or if you are vegetarian. In most countries, fish and eggs are considered a vegetarian food.
- Eat only food that's been thoroughly cooked and is still hot.
- Avoid cooked food kept at room temperature for several hours.
- Avoid food bought from street vendors.
- Avoid uncooked food, apart from fruit and vegetables which can be peeled or shelled.
- Boil water for drinking or brushing teeth if you're unsure of its safety. If you can't boil it, use a disinfectant tablet or a certified and well-maintained filter, or stick to bottled water.
- Avoid ice unless you know it's made from treated and chlorinated water.
- Cold bottled and packaged drinks are usually safe, as long as they're sealed. Hot drinks are also usually safe.
- If you were abroad for a long time, avoid eating very spicy food immediately after your return to your home country. Give your stomach at least one day to adjust.

Hotel Safety

- If possible, find out about the hotel and the area it's in, before you arrive.
- Always lock the door and use the safety chain and window locks if fitted.
- If your room doesn't have a chain or spyhole, ask to change to a room that does. If you're staying for a longer period, consider moving to a hotel with these features.
- Find the nearest fire alarm and extinguishers, and make sure you know your emergency exit route.
- If possible, carry a personal fire/security alarm which can be fitted to your room door so it will sound if the door opens or it detects smoke.
- Keep important and valuable items (including computer files) in the hotel safe when you're not in your room.

- Avoid keeping large amounts of cash in your room.
- Get reception/concierge to call if you have visitors, and meet them in a public area rather than your room.

Local transportation is coming up next.

Ashish

Ashish Rath may be contacted
via e-mail to michele@worldwidedrillingresource.com

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The "Idiots" Corner

by "Billy Bob Smith"

"Never argue with stupid people. They will drag you down to their level and then beat you with experience."

~Mark Twain

If you think it's just idiots who do dumb or stupid things, here are a few examples of so-called smart people doing stupid stuff.

First, I need to give you a smart person's take on this topic, so you can make your own comparisons: "We all probably know someone who is intelligent, but does surprisingly stupid things. My family delights in pointing out times when I (a professor) make really dumb mistakes. What does it mean to be smart or intelligent? Our everyday use of the term is meant to describe someone who is knowledgeable

and makes wise decisions, but this definition is at odds with how intelligence is traditionally measured. The most widely known measure of intelligence is the intelligence quotient, more commonly known as the IQ test, which includes visuospatial puzzles, math problems, pattern recognition, vocabulary questions, and visual searches." *Anonymous professor at a prestigious university*

Feel better now? Back to a few examples:

- A psychology prize was given for - well, you decide. Researchers in Belgium, Germany, Canada, and the U.S. interviewed 1000 liars on how often they lied, and the prize went to the person who guessed which liar was telling the truth.
- The police department in a "C" city (which will remain nameless) offered to pay police officers bonuses if they would refuse to take bribes.

How about a few U.S. laws passed by state legislature:

- If you sell liquor, it's illegal to advertise wine in a manner which suggests it has alcohol in it.
- A senior government official had his computer hacked because his password was 123456789.

How about wasted government money?

- The National Institutes of Health spent \$230,000 to find out the color of red made monkeys amorous.
- Brown University researchers received \$5,000,000 for a study to see if fraternity and sorority members wanted to drink more than nonmembers.
- The National Science Foundation got \$150,000 to find out why Americans are so stressed about politicians, when they would have gladly given the answers for free.

Let's close with a few of my favorites - lawyers. Lawyers have actually asked witnesses the following: How many times have you committed suicide? Was it you or your brother who was killed? Without saying anything, tell the jury what you did next. Was that the same nose you broke as a child?

I could go on for pages with dumb stuff so-called smart people do in every profession, but I'm sure you have some of your own favorites. Why not share them with us?

Billy Bob

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Air Compressor Maintenance Tips

*Adapted from Information
by Air Compressor Service
Kits & Accessories*

Air compressors are useful investments, but to get the most out of them, they must be properly maintained. This will allow the compressor to operate at maximum efficiency, increasing the life of the machine.

One of the most important aspects of properly maintaining an air compressor is to read the owner's manual. This is quite basic, but the manual will have specific maintenance recommendations from the manufacturer, which will help prolong the life of the compressor.

The receiver tank of a compressor collects moisture from the air it compresses. Most tanks have a valve for draining this moisture, and it must be drained regularly to prevent too much water from accumulating in the system. Before accessing the drain valve, the air pressure from the tank should be released.

A filthy air filter can harm a compressor by allowing dirty air to enter the inner workings of the machine. If the compressor is forced to work too hard to intake air because of a dirty filter, it will lose power on its compression. This will gradually degrade the quality of the tool, so it is important to keep the air filters as clean as possible and check them regularly. It is also important to make sure the right kind of filter is used.

Compressors which use oil must be checked on a daily basis to keep the fluid level at the right amount. It should be topped off when necessary and changed about every 300 hours of use.

For engine-driven compressor units, periodically clean out the fuel tank to ensure optimal operating conditions. Cleaning out the engine should be done once every year or so to remove any residual buildup from the fuel.

As a compressor operates, it will vibrate, causing the nuts, bolts, and screws to sometimes become loose. Keep an eye on these fastenings and examine them every so often to see if they need to be tightened.

Hoses are a crucial component of a compressor. If they are cracked or become too worn, it can put quite a bit of stress on the equipment and result in leakage. Any sign of corrosion or other damage means they should be replaced right away.

Compressors have a built-in safety pressure valve. The function of this valve is to open if the compressor's pounds per square inch (psi) gets too high. By testing this feature, it will help prevent air receiver accidents from happening.

If the intercooler fins and tubes become dirty, then they can't do their job, which is to reduce the operating temperatures of the air compressor. Clean them regularly by blowing them off with an air hose to keep the operating temperatures down.

These tips will extend the life of the compressor and keep the machine operating efficiently, allowing for more productivity on the jobsite.



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Time for a Little Fun!

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

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Boring Thoughts

by **Todd Tannehill**
Owner, **Mud & More, LLC**

The Blurred Lines of Drilling Fluid

Designing a drilling fluid mix is not black and white. Manufacturers' mix recommendations are a starting point. Failure to pivot from the recommendations,

when the job conditions dictate, can be downright dangerous when designing a mix.

When I first started my career in drilling fluids, I would double-check myself with several veteran "mud doctors" before providing an on-site mix. I worked with the best of the best, but guess what? They all had a different way of approaching the soil conditions. The frustrating part was, I would get 3-4 different mixes and they were all effective. Some used more product, and some used less, but each of my peers had a favorite product or combination of products they trusted. One would prefer liquid polymer, and another dry; managers who worked in cold weather states had a different product list than the southern manager. Like most people, the fluid experts become stuck on certain products.

Being newer, I decided to experiment with the different combinations on different jobs. I had the luxury of good peer advice and my mind was open to new ideas. I integrated the advice and found a combination of products that worked well in each condition; consolidated and nonconsolidated variations which soon became my trusted go-to products. The products stayed steady, but the ratios changed by the job.

The lines are blurred when it comes to mixing drilling fluids; there is no black and white. The baseline is set as a starting point for our mix, but the rest of the charts or technical data sheet recommendations are all based on very average soil conditions. The published sand mix is a great start for a known sandy location, but what if you hit sugar sand or a sand with a clay mix? You must be ready to adjust to the current conditions at each jobsite. You can use your last success as a base, but be ready and willing to pivot to react to returns and operator feedback.

I've seen drilling fluid mixes where the ingredients look like a recipe for Grandma's wedding soup! They used so many products I am not sure how they duplicated the success in each tank. One of my colleagues and I rolled up on a job where the mix had many polymers, additives, and MMOs (mixed metal oxides) in it. Based on our knowledge of the added products,

the mix was working against itself. When we questioned the combination, we were told it was working, and they were uncertain what was working and not working - so they were using it all.

Less is more as you set your base fluid. Four to five products, including soda ash and bentonite, is my goal. Keep it simple and the adjustments and fine-tuning are easier as you progress. Knowledge of the area to be drilled helps lessen the blurred lines and sets you up for success. Your trusted drilling fluids confidant can help you design a simple mix and adjust when needed on the job.

Todd

Todd Tannehill may be contacted via e-mail to michele@worldwidedrillingresource.com



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Unique Service Agreement Leads to Improved Productivity

Adapted from a Press Release by Sandvik

We've all been in a situation where we've pondered the worth of a service agreement. In the mining industry, an hour of downtime can cost thousands, so would a service agreement be a good investment? A remote Chinese mine has discovered the answer for their operation. The company reduced costs and improved predictable productivity thanks to the Sandvik 365 service agreement.

Guizhou Kailin Group Co. Ltd. (Kailin) has been a long-time customer of Sandvik with a fleet of 65 drill units in operation at its four mines in southwest China. The company decided to try the Sandvik 365 service solution.

Since the agreement was signed in 2016, Sandvik has provided on-demand services including on-site inspection, evaluation, maintenance, and overhauling. Sandvik technicians run a service exchange at the Kailin service yard in the center of Jinzhong. "Kailin



and Sandvik have been cooperating for more than 30 years, so we know each other's methods very well," said Jun Chen, Sandvik key account manager. "We have matched and aligned our operational method according to Kailin's. Everything from the supplying of the parts to the operations to the after-market service is designed with customer satisfaction in mind."

In 2016, Kailin approached Sandvik with a need to improve maintenance routines. A Sandvik-branded maintenance container equipped with professional maintenance tools, testing tools, original parts, and a backup drill to reduce downtime was selected.

Lin Ouyang, vice manager of drilling at Kailin said, "The container solution is designed to increase our ability to perform maintenance and repairs on-site. It helps us to reduce the likelihood of problems, and fix the problems that do occur in a more efficient way. Before the regular maintenance was introduced, drilling a single blasthole could take up to 90 seconds. Now, with the machines properly serviced, the average is down to 60 seconds. The price we pay for this service contract is very small considering the efficiency improvements we are seeing."

Xingfeng Lu, one of the Sandvik technicians based in Jinzhong, said the convenience to the customer is the biggest benefit, but flexibility is still key. "The plan is to give the local technicians training whenever there is an issue with the rock drill, but in such remote areas we need to work together and be prepared to pitch in," he stated. "If the customer is short on staff, we can lead the maintenance activity with Kailin personnel providing support. It's a very flexible arrangement."





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In Memoriam

Thomas David "Dave" Dotson

The management and staff of **WWR** was very saddened to learn of Thomas David "Dave" Dotson's passing on January 20, 2018, in Bakersfield, California, at 70 years of age.

After 25 years of factory sales and management, Dave was faced with changes and the possibility of moving his family. So the decorated Vietnam War Veteran decided to use his experience in drilling, pumps, equipment, and accessories to start his own business, Dotson Sales, as a manufacturer's representative, which he continued until he retired in 2017.

For almost 30 years, he represented various manufacturers by providing sales and technical support, trade show representation, and participation at open houses and seminars throughout California, Arizona, Nevada, and New Mexico. He was very proud of the high-quality products he represented because they were predominately made in the U.S.

After his retirement, he had the opportunity to spend time with his wife Patsy, who also retired in 2017. They traveled and visited with their children, grandchildren, and his sister who lives in Southern California. He also spent some time with his parents before his father passed away in October, and mother in November.

Known by many, Dave became a legend in his own time ~ always a smiling face to greet you and much to share. Dave could carry on a great conversation and had a tremendous sense of humor. He will be greatly missed.

He had requested no services or memorials except for his immediate family to scatter his ashes over various areas he had designated as special to him.



The WWR Team had the pleasure of taking this photo of Jan Oster and Dave Dotson at the Groundwater Week 2016 event where they were obviously having a great time. The top photo was taken during the 2015 California Groundwater Association Convention.

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Is Life Really all that Difficult?

by Tim Connor

One of my hero's, the late Norman Vincent Peale once said, "There is only one group of people that don't have problems in life, and they are all dead."

So in a way, problems are a sign of life. So, do the more problems you have in life mean the more alive you are? Can't answer it, sorry. However, my addition to Norman's quote would be, "If you don't have ANY problems today, maybe you are on the way out of here and you just don't know it yet." Come on Tim - get real - problems are not fun and no one wants or likes them. You're right - but there is no way you will get out of here without them, so why not just chill, relax, and use them to get better, stronger, and wiser - rather than to whine, complain, and sulk?

The above (my take on this) could be perceived as a tongue-in-cheek philosophy of life. However, it is closer to the truth than you might think. One thing you and I have both learned is everyone has problems. Some folks have relationship problems, others financial, some career, others health, social, business, and some even all of these at one time or another during their life. No one - let me repeat no one - is immune to adversity or difficulty in life, regardless of how smart, wealthy, or good-looking you are!

The key to inner peace, happiness, and success is to accept the issues, negatives, problems, situations (I don't care what you choose to call them) life hands you as a part of the life process of becoming, growing, and learning. Failures, whiners, or victims see problems as life picking on them. Winners, regardless of their position, status, age, or circumstances see problems and adversity as a catalyst to becoming better, wiser, and more aware of the reality of their life and how to deal with it.

Problems are not positive or negative, they are neutral. It isn't what is happening in your life which matters, it is how you choose to see it, interpret it, then what you do with or about it.

Learn to see the negatives as loving teachers in your life bringing you the opportunity to get a clearer vision of where you need attitude adjustments, improved thinking, better skills, or change in some way.

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

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Notes from the Groundwater Guy

by Thomas E. Ballard, P.G., C.H.G.
Southeast Hydrogeology, PLLC



Wellhead Protection and Source Water Assessment

When locating a new well, finding water is only part of the challenge. Making sure the water the well produces is clean - and is likely to stay clean - is the other vital component of a successful well installation.

The capture zone of wells and potential to draw in contaminants is dependent on topography, geology, pumping rates, and other vulnerability factors. There are two concepts which must be understood to determine the potential for contaminants to impact a well:

Zone of Contribution (ZOC) - The area surrounding a pumping well, which encompasses all areas or features which supply groundwater recharge to the well.

Zone of Influence (ZOI) - The area surrounding a pumping well within which the water table or potentiometric surfaces has been changed due to groundwater withdrawal.

Once the ZOC and ZOI are defined based on the well characteristics, the next steps are to determine wellhead protection areas and an overall Source Water Assessment Plan (SWAP).

Wellhead protection areas protect public water systems using groundwater from contamination from sources such as industrial spills, shallow underground injection discharges [referred to by Environmental Protection Agency as class V (5) wells] through wells, floor drains and septic tanks, leaks from underground storage tanks, etc. Wellhead protection zones are designed based on the underlying geology, well design, and the zone of contribution and zone of influence which determine the potential for activities in the wellhead protection area to impact the well.

Source water assessments are usually made prior to construction of a public water system well and periodically during the life span of well operation.

Source assessments . . .

- Delineate source water and wellhead protection area;
- Develop a baseline of water quality and quantity information;
- Catalog an inventory of activities and potentially contaminating activities (PCAs) in the source water protection area; and,
- Create a risk assessment to determine the potential vulnerability to contamination from the identified potential sources.

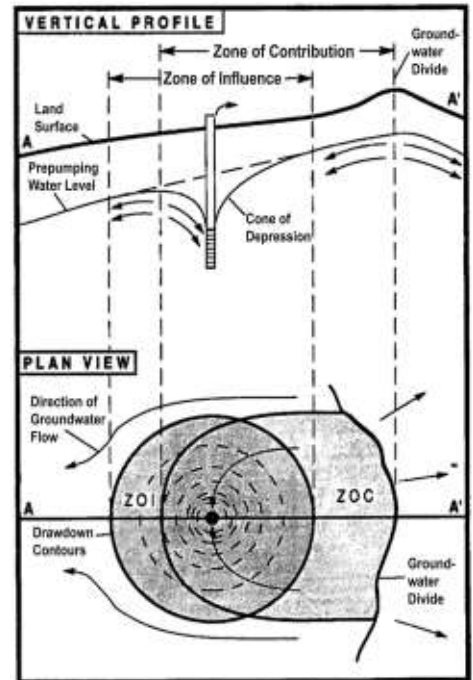
Besides PCAs, well construction can also determine the vulnerability of the well with older wells, shallower wells, wells located in areas of high groundwater velocity, and wells located in areas of rapid recharge considered to be the most vulnerable.

The 1996 Safe Drinking Water Act mandated Source Water Assessment Programs (SWAPs) by each state, but most of these were completed in the early 2000s, and changes to land uses and new PCAs have rendered many of these SWAPs out of date, potentially endangering water quality in those areas. Needless to say, new public water supply wells require a source water assessment, but existing wells are generally due to have their source water assessments updated also. Some regulatory jurisdictions mandate SWAP forms, and the associated specific information must be completed for new wells.

Residential wells, due to their smaller production capacity, have smaller zones of contribution and zones of influence, but can still be impacted relative to their location with respect to things like septic systems, animal enclosures, and other potential sources of contamination. It is important to identify and locate these potential contamination sources prior to siting a residential well.

Karst and areas with high rates of surface water infiltration are especially susceptible to surface contaminants. Groundwater movement in karst environments can be measured in miles per day in some circumstances, so it is important to understand flow paths relative to potential sources of contamination in karst conditions.

Proper establishment of wellhead protection areas and source water assessments can go a long way to assure the groundwater produced from a water supply well is, and remains, clean over the life of the well.



Tom

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



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in different colors. Rubies are red, and sapphire encompasses all other colors, although the most popular and valued color of sapphire is blue. The names ruby and sapphire are only used to describe the gem variety, otherwise the mineral is simply called corundum.

The mineral is widely known for its extreme hardness, which makes it an excellent abrasive. Natural and synthetic corundum are used in a variety of industrial applications because of their toughness, hardness, and chemical stability. The mineral is used to make industrial bearings, scratch-resistant windows

for electronic instruments, wafers for circuit boards, sandpaper, and many other products.

Cryolite is a colorless to white mineral. It occurs in a large deposit in Ivigtut, Greenland, as well as in small amounts in Spain, and Colorado in the U.S. The mineral is also manufactured synthetically. In the 1890s, cryolite was recognized for its important use in the production of aluminum. This led to heavy mining of the mineral in Greenland throughout the 1900s. In 1987, the cryolite mine in Greenland, operated by the Danish Cryolite Company, was abandoned after 130 years of activity.

Cryolite is used in soda and enamel production. It is used as a solvent for bauxite in the electrolytic production of aluminum and has various other metallurgical applications. It also has applications in the glass industry, as a filler in bonded abrasives, in the manufacture of insecticides, and gives fireworks a yellow color.



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Game-Changing Compression Innovation

Adapted from a Press Release by PR Web

Texas-based Hicor Technologies, Inc., a compression technology company for the gas and oil industry, announced the United States Patent and Trademark Office has issued US Patent No. 9,856,878, covering a method and apparatus used in multiphase compression.

Compressors are used throughout the natural gas production process. Hicor believes it has come up with a radical idea to improve production while decreasing the energy and associated costs to produce gas and oil wells. This compressor allows even marginal wells to be economically produced, and extends the life of the wells.



Hicor technology can improve the overall appearance of the site and reduce the wellhead footprint.

Instead, a multiphase stream is pumped from the wellhead to a central facility for separation and processing. This eliminates fugitive emissions (pollution from leaks in equipment, pipelines, seals, valves, etc.) and improves the economics of wet gas production significantly.

According to Jeremy Pitts, Hicor's chief technology officer, "Hicor is pleased and honored to have carved out such a large portion of the compressor technology landscape. We're convinced that wet gas compression is the future of the industry . . ."

This is actually one of several patents held by the company. In total, Hicor holds four patents in the USA and seven international patents, with many more pending.

"Hicor has introduced the first breakthrough technology to the oil and gas compression industry in over 50 years," said William Sayre, CEO of Hicor. "Because we fundamentally think about compression differently than the industry has traditionally, we have been able to identify large opportunities to secure Hicor exclusivity to operate in wet gas and high ratio applications via our intellectual property strategy . . ."

The company is currently undergoing commercial demonstration projects with select customers and is actively seeking additional interested parties to partner for further deployment.

This patent covers operating a compressor in wet gas applications where liquids are present in the gas stream. While conventional compressors are only capable of handling dry gas, this wet gas compression system eliminates the need for liquid separation at the wellhead.

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Ronnie's Real World

As you read these Chapters from Justin, can't you just feel his excitement about "his future in the drilling industry" and his eagerness to do his very best for our drilling industry?

Future & Current Landscape of Water Well Drilling Chapter 2

Justin Hammond, Martin B. Hammond Co. Ltd.

When we left off last month, Justin was giving us some background on his family. Now on to him . . . "I've been in this industry since I was 13, when I first began on the pump truck. It was my first real job, aside from cleaning out trucks and picking up bricks when I was ten. I always knew it would be hard work and long days, which it was. I worked with my family business in the summers, until I graduated high school. When I was 22, I began my first semester at Fleming College, in the Resources Drilling and Blasting program. I had no idea what to expect, as this would be my first time attending post secondary education. The program was very theory rigorous, I spent long hours reading text books and writing assignments. The information was very broad-based, spanning all aspects of rig maintenance, hydraulic systems, communications, geology studies, and math classes; as well as individual courses on water, geotechnical, blast, HDD [horizontal directional drilling], rotary, and diamond core drilling. The course also had two-hour labs a couple times a week, outside working on various pieces of equipment, depending on what the current drilling class was. They were mainly safety and discussion focused. I quickly realized the skills required to operate a drill rig were going to have to be learned in the field at work. I worked hard in college and graduated with top marks. The course opened my eyes to the broad world of the drilling industry.

I was excited to get back home and start to work again. I quickly discovered that I had many skills left to learn before I could actually be a well drilling professional. I need to learn to weld, use a torch, drive a truck, deal with customers, and figure out job pricing. School was only the tip of the iceberg. On top of learning these skills, I also find myself thinking about the problems of this industry, the business landscape, and the future."

To be continued next month . . .

This truly is, Ronnie's Real World . . .





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Strong International Presence at Expomin 2018

Adapted from Information by Messe Düsseldorf North America

Expomin 2018, Latin America's Premier Mining Exhibition, is scheduled for April 23 - 27, 2018, in Santiago, Chile. Companies from China and all parts of Asia, Europe, North, Central, and South America, as well as Africa have registered to present their latest technologies, equipment, machinery, and services.



The event is a cooperative effort between German trade fair organizer Messe Düsseldorf and the Chilean trade fair organizer Fisa S.A. "The use of state-of-the-art technologies is also a decisive success factor that positively impacts safety at work, productivity, sustainable cost management, and resource protection in mining.

Expomin 2018 is the platform where Latin American mining experts learn about the new developments on the world market and negotiate with suppliers right on-site," stated Erhard Wienkamp, executive director at Messe Düsseldorf.

Once again, Expomin will feature the USA Pavilion organized by Messe Düsseldorf North America. The USA Pavilion, located in the center of the show in hall 2, will be filled with U.S. companies exhibiting the latest in technology, products, and services. Exhibitors will also have access to a lounge with catering, Internet access, and translation services along with extra meeting rooms.

The trade fair was designed to meet the needs of miners, mining engineers, buyers, scientists, metallurgists, international investors, and ministries. In addition to exhibits and plenty of networking opportunities, this international conference will address the core topics of sustainability and productivity for modern mining through its workshops and seminars.

Chile is an important supplier of precious metals and also home of the world's largest producer of copper. The challenges in Chilean mining such as scarce water resources, comparatively high wage and energy costs, and diminishing ore content in existing reserves require cutting-edge technology like water-saving ore treatment and process optimization. This is an excellent opportunity for companies to establish themselves on the Latin American market.

Celebrate National Groundwater Awareness Week!

Adapted from Information by the National Ground Water Association

Groundwater is one of our best natural resources and without it, life would cease to exist. Rather than taking groundwater for granted, celebrate national Groundwater Awareness Week, March 11-17, 2018. This year's theme, Test. Tend. Treat. was established to encourage a universal approach to sustaining an adequate supply of quality water.

Established in 1999, Groundwater Awareness Week provides an opportunity to learn about the importance of groundwater and how this vital resource impacts our daily lives. For example, did you know 53.5 billion gallons of groundwater are used for agricultural irrigation every day? Any idea which state pumps the most water? If you said Texas, you would be wrong. Texas does, however, lead the nation in the number of irrigation wells with more than 77,000. California pumps the most groundwater,



10.7 billion gallons each day, with Texas coming in second by pumping 8.02 billion gallons per day. Overall, groundwater is the most extracted raw material in the world, with estimates at 259 trillion gallons per year. The good news is, groundwater is a renewable resource, as long as we are careful not to extract groundwater faster than it can be replenished. So, do your part by using water wisely and making sure it isn't wasted.

Groundwater Awareness Week is the perfect opportunity to spread the word about the responsible development, management, and use of water. Federal agencies, major cities, counties, local organizations, groundwater professionals, students, businesses, associations, and more participate in the event around the country.

A large advertisement for Marl Technologies. On the left, there is a logo for "40 MARL TECHNOLOGIES CELEBRATING 40 YEARS" above the text "Stand Apart From The Competition". Below this, there is a paragraph of text: "The versatile MARL A/R 80 auger/rotary combo drill is popular with both drillers and clients for its excellent production rates, durability and ease of operation. Save your client money by sending only one drill to the site. High production in both auger and rotary modes. See our website for more information!". At the bottom left, there is a yellow box with the phone number "720.822.2293 | 1.800.404.4463" and the website "marltechnologies.com". On the right, there is a large image of a blue and white MARL A/R 80 auger/rotary drill rig. Above the rig, the text "MARL A/R 80" is displayed, followed by "Power and versatility that can handle the toughest terrain and drilling conditions.".



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Frequently-Used Geological Terms Part 70

Glossary Adapted from the Dictionary of Geological Terms

P

Potassic - Said of a rock or mineral containing a significant amount of potassium.

Potassium Bentonite - A potassium-bearing clay of the illite group, formed by alteration of volcanic ash.

Potassium Feldspar - Any of several varieties of alkali feldspar, including sanidine, orthoclase, microcline, and adularia, that contain a high proportion of potassium relative to sodium. Also called K-feldspar.

Potential Ore - Undiscovered mineral deposits, or a known mineral deposit for which recovery is not economically feasible. Also known as possibly ore, inferred ore, or indicated ore.

Potentiometer - An electrical instrument for the precise measurement of low-level direct-current voltages.

Potter's Clay - A plastic clay free from iron and devoid of fissility, suitable for modeling or making of pottery or adapted for use on a potter's wheel. It is white after firing.



Photo of Pozzolan deposits in Southern California by Dr. Vladimir Ronin.

Pozzolan - Siliceous material such as diatomaceous earth, opaline chert, and certain tuffs, which can be finely ground and combined with portland cement. The pozzolan reacts with calcium hydroxide which is liberated as concrete hardens, forming compounds with cementitious properties. Pozzolans also counteract the adverse effects of certain undesirable aggregates which may have to be used in concrete. Portland-pozzolan cements are highly resistant to penetration and corrosion by saltwater. The name comes from the town of Pozzuoli, Italy, near which occurs a leucite tuff which was used in cement in Roman times.

Precambrian - All geologic time, and its corresponding rocks, before the beginning of the Paleozoic. It is equivalent to about 90% of geologic time.

Precious Metal - Gold, silver, or any of the minerals of the platinum group.

Precious Stone - A relatively rare, durable gemstone of unusual beauty such as diamond, ruby, emerald, and sapphire.

Pressure Head - The height of a column of liquid supported, or capable of being supported, by pressure at a point in the liquid. The height a column of water rises in a tightly-cased well. The pressure head is commonly expressed with reference to the land surface at the well or to some other convenient level.

Look
for more terms
next month!



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Understanding the Earth Beneath our Feet

Adapted from Information by the U.S. Geological Survey

Last month, we discussed how the U.S. Geological Survey (USGS) houses a collection of rock cores from more than 9000 wells, and cuttings from more than 52,000 wells. They are stored at the Core Research Center (CRC) in Denver, Colorado. We also discovered how the gas and oil industry has used reanalysis of the cores to rediscover valuable gas and oil resources. Can these cores and cuttings be used to help other industries?

Water - With groundwater supplying roughly 25% of the freshwater used in the U.S., locating reliable sources of groundwater for consumption, agriculture, and industry is vital. USGS researchers, state water departments, water conservation boards, and water districts, all use cores and cuttings to gather detailed geological, as well as hydrological, data on aquifers. Knowing the porosity and permeability of the rocks in an aquifer helps researchers understand the ability of liquids to flow, and the impact the movement of the water can have. These studies can determine the conditions for aquifer recharge and its vulnerability to contamination. Naturally-occurring trace elements in rocks and sediments can be a source of harmful contaminants impacting water quality. By storing rock materials obtained from the aquifers, the CRC provides important resources to determine water quality and quantity.

Infrastructure - Roads, bridges, and buildings use large quantities of concrete and steel, but before they can be constructed, we need to understand the geology of the ground below. Tall buildings must be on solid bedrock, and if roads or other structures are built on unstable conditions, they can suffer failure and expensive damage. Knowing what's on the surface simply isn't enough - we need to examine cores and cuttings to get a better idea of the conditions below the project.

Education - University professors often bring their earth science classes to the CRC to compare different rock types from various geographic areas. Students also learn about core descriptions and research techniques. Industry organizations are able to hold workshops at the CRC, giving both seasoned professionals and students the opportunity to learn with actual cores. Researchers from nonprofit entities, such as universities, government agencies, and museums, gain access to materials which would be too expensive for them to obtain through new drilling. Many useful articles, theses, and dissertations have used the CRC for research. This has led to new insights into the earth and changes the scientific understanding of depositional systems, tectonic controls on facies variations, and the nature of hydrocarbon reservoir systems.

Although drilling and coring operations can be costly, the resulting materials provide a wealth of scientific information worth preserving for future use. The CRC is one of the largest core repositories in the United States. These stored materials can be studied with very little expense, especially compared with the costs of planning, permitting, drilling, and coring a new well. At today's prices, redrilling the entire collection would cost more than \$80 billion. These preserved cores and cuttings are an actual representation of the substrata, providing vital information used to locate new sources for water, energy, and mineral resources.

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Scholarship Award Winners Announced

Adapted from Information by the West Virginia Water Well Drillers Association

West Virginia Water Well Drillers Association awarded three higher education scholarships. Scholarships of \$1000 each were awarded to the following students for the 2017-2018 year:

Benton L. Anderson - Anderson Well, Pump, & Septic

Jessica Paige Harmon - Harmon & Son Well Drilling

Samantha Tuckwiller - Tuckwiller Well Drilling

Congratulations from the WWDRA Team!





by Tim Rasmussen

Seth Weilage walked around in the cavernous room at the Groundwater Week convention in Nashville last December. There were hundreds of booths and exhibits of machinery and equipment, but he was keeping his eye open for Water For Life (WFL). Seth introduced himself when he found the WFL booth. He had

seen the booth at previous conventions and wanted to talk to Gary Bartholomew. Seth wanted to get some experience on a cable rig and had always wondered about drilling on some sort of mission project. He wanted to do something like this, so he took a chance and volunteered to come for two weeks and find out what it was like.

Fast Forward to Guatemala - Nuevo Santa Elena is a little barrio outside of the city of Santa Elena. There is no public water source in the village. The community gets water delivered and placed into open barrels beside the road. The villagers dip buckets of water from the barrels for use at home. This is the only place the people have to get water.

This all changed with the help of Water For Life, and two volunteers. Seth Weilage from Council Bluffs, Iowa, teamed up with Adrian VanMourik of Toronto, Ontario, Canada, to bring real changes to the people who live beside the road in this little village. Adrian had been a volunteer before, and was eager to come back for another season.

The drilling site in Nuevo Santa Elena was on the side of a hill, but there was a level pad and the access was not too difficult. It was hot and the sun was high as Seth sat in the little shade he could find. He was getting used to the noise of the cable tool relentlessly dropping the drill string, picking it up to drop it again; but he wished the breeze would pick up. He and Adrian were making slow and steady progress with the drill.

He noticed some of the village ladies drifting by. Each had a water jug on their hip or was carrying it. They were headed to the large open barrels of water the city placed for the villagers beside the road. The city sent a truck twice a week to refill the barrels, but there was no lid or spigot on them. After a while, Seth would see the ladies walking back, usually with the jugs balanced on their head or carried on their hip. They laughed and talked as they walked in the heat carrying the heavy jugs.

Their homes were not much - some boards for walls, a few pieces of tin for roofs, and dirt floors were the usual. Here and there were some small concrete block rooms. There were thin dogs and chickens running around picking up every edible scrap of anything, and children playing amongst them. He had not seen any sanitary facilities anywhere. This was village life, hard and dirty.

More of Seth's experience drilling in Nuevo Santa Elena next month.



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

Tim

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

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Tentative Conference Schedule

Tuesday, April 17, 2018

10:00 am - 9:00 pm: Early supplier booth set-up in exhibit hall
3:00 - 7:00 pm: Conference registration booth open for registration

Wednesday, April 18, 2018

7:00 am - 5:00 pm: Conference registration
7:00 am - noon: Supplier booth set-up in exhibit hall
7:30 am - 12:30 pm: Paul Muehl Memorial Clay Shoot at Buffalo Chip Shooting Complex
7:30 am - noon: Bob Martin Memorial Golf Scramble (location to be announced)
7:30 am - noon: Crazy Horse Mountain Tour leaves conference lobby (carpool)
Noon - 12:45 pm: Lunch, poolside
Noon - 7:45 pm: Supplier booths open in exhibit hall
1:00 - 5:00 pm: Regulatory session and panel discussion with break
5:00 - 7:00 pm: Primer hour (refreshments and hors d'oeuvres)

Thursday, April 19, 2018

7:00 am - 5:00 pm: Conference registration
7:00 am - 5:00 pm: Supplier booths open in exhibit hall
8:30 am - noon: Opening session, technical sessions with break
Noon - 12:45 pm: Lunch, poolside
1:00 - 5:00 pm: Technical sessions with break
5:30 - 6:30 pm: Booster hour in exhibitor hall
6:30 - 9:00 pm: Annual awards banquet and live scholarship auction

Friday, April 20, 2018

7:00 - 10:30 am: Supplier booths open in exhibit hall
8:00 am - noon: Technical sessions with break
Noon - 1:00 pm: Lunch with attendance door prizes, poolside
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What to do if you are Trapped

Information Provided by America's Electric Cooperatives

Do you know what to do if your vehicle has crashed into a utility pole? What if you see a car trapped under downed lines? Knowing what to do can be the difference between life and death. Do you exit the vehicle or stay inside?

Although your initial thought may be to get out of the car, in vehicle accidents involving downed power lines, that decision can lead to tragic, if not deadly, results. Your best bet is to stay in the vehicle, call 911, and wait until the local electric utility company arrives to de-energize the line. Then you can safely exit the vehicle.

You see, the vehicle itself will act as a path for the electrical current to travel to the ground. So, you are safe inside the vehicle, but if you get out, you could get shocked or electrocuted.

Remember, there is **ABSOLUTELY NO WAY** to tell if a line is energized just by looking at it. So, you should treat every power line as if it is energized and dangerous until utility crews tell you otherwise. If you come upon or witness an accident involving downed power lines, don't leave your vehicle. Stay far away and keep others away as well. Don't drive over downed power lines either.

There is one exception and it involves fire. If you are inside a vehicle with a downed power line on it and it catches on fire, then you must get out. However, you have to exit carefully by following these steps:

- 1) Jump out of the vehicle making sure no part of your body touches the ground and the vehicle at the same time.
- 2) Make sure you land with both feet together and in small, shuffling steps, move at least 40 feet away from the vehicle.
- 3) The ground may be energized, so shuffling with both feet together decreases your risk of electrical shock.

It isn't only accidents which cause power lines to fall, trees and limbs falling onto lines could also cause them to land across a road or into your yard. Your best bet is to stay away from downed power lines and anything that might be touching them. It is also important to remember the ground around a downed line could be also be energized. Under no circumstances should you try to move a downed power line, or anything else in contact with it. Even nonconductive materials like wood or cloth can conduct electricity if it's even slightly wet.



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

Safety Companies Merge

Adapted from a Press Release by Checkers Safety Group

Justrite Safety Group and Checkers Safety Group, both part of Audax Private Equity, have merged creating a leading manufacturer of industrial and environmental safety products.



Since 1906, Justrite® has provided products for the safe management of flammable liquids and other hazardous materials. Products include safety cabinets and large outdoor storage buildings; safety vessels and containers for laboratory and industrial applications; spill containment; safety showers and eye/face wash; and other products to help industrial customers maintain safe practices.

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

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The 53rd Annual Shallow Exploration Drillers Clinic (SEDC) is packed with a full agenda of technical presentations, featuring a National Drilling Association program. This traveling event will be held April 17-18, at the La Vista Conference Center and Embassy Suites by Hilton in La Vista (Omaha), Nebraska.

Indoor and outdoor displays of products and equipment to aid the exploration drilling industry will be available Tuesday from 7:00 a.m. - 7:00 p.m. and from 7:00 a.m. - 3:00 p.m. on Wednesday.

Register at <http://sedc.unl.edu/clinic/2018clinic.asp>



Get charged for the 31st Annual Best in the West Drill & Blast Conference at the Spearfish Holiday Inn and Convention Center in Spearfish, South Dakota, April 18-20, hosted by the Northern Plains Chapter and Black Hills Chapter of the International Society of Explosives Engineers.

Off-site events on Wednesday include the Paul Muehl Memorial Clay Shoot, Bob Martin Memorial Golf Scramble, and Crazy Horse Mountain Tour. All start at 7:30 a.m. The exhibit hall supplier booths open at noon, the regulatory session and panel discussion run from 1:00 - 5:00 p.m., and the primer hour with refreshments is from 5:00 - 7:00 p.m.

The exhibit hall of vendors is open again Thursday, from 7:00 a.m. - 5:00 p.m. Education and technical sessions are from 8:30 a.m. - 5:00 p.m., with the booster hour starting at 5:30 p.m. The annual awards banquet and live scholarship auction will begin at 6:30 p.m.

Friday has the exhibits open from 7:00 a.m. - 10:30 a.m., technical sessions from 8:00 a.m. - noon, followed by lunch and door prizes. Don't miss it!

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Mark your calendar for the Geoprobe[®] Open House, April 26, in Salina, Kansas. If you are a customer, consultant, regulator, or industry professional who wants to spend time with Geoprobe[®] engineers who design new and innovative machines and tooling, this is where you need to go.

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People from around the world see new releases and hear about new technology still in development during this day-long event. Team Geoprobe[®] also demos their machines and tooling - showing what happens during work in the ground. Workshops are available and the service team is ready for your questions. Lunch is provided, along with Team Geoprobe[®]'s specialty - homemade ice cream!

Sign up at www.geoprobe.com/oh18

See more events at www.worldwidedrillingresource.com online issue.



Oil/Water Exploration

by *Harold White*

There are a lot of gas and oil companies around the world, exploring onshore and under the oceans offshore. Exploring is time-consuming and costly. A lot of drilling and core sampling efforts do not always result in a positive way. Years can go into this type of exploration with no great success.

I am writing this in a local restaurant, where the waitress, Debbie, knows very little about me, except that I drill wells. She asked what I was doing, so I told her I was writing an article for *WWD*. When she wanted to know what it was about, I told her gas and oil exploration and how easy it is for me and

how hard it is for others to do the research and drilling.

I said I would know the day I got to an area if the location had gas, oil, water, etc., and if it was of great value. I could set the drill sites over several levels of whatever fluid someone was looking for. This is done with unbelievable accuracy and concern.

I enjoy going to other states and countries and helping in some way. There are many places out there to explore. I would be glad to search a site where there was trouble finding any fluid when drilling. My latest discovery is finding saltwater carrying lithium.

Harold

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



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My brother-in-law was reconfiguring his water lines to work with a new addition. He was also upgrading to new and better components. He had decided to remove and discard the old galvanized tank and move all the components inside out of the weather (where they have been for about 20 years).

All the old components were removed and discarded. The new system was installed (and really looked good). Then late that evening, I went over to make sure they had water, and low and behold there was no power getting to the well pump. It turned out the control box had a problem. I just happened to have one sitting on the shelf from a customer's well we had to test pump. So we installed it, and the well kicked right on like it was supposed to, but the next day it appeared the well was running a lot (on, off, on, off). It appeared the water was draining right back down the well. Guess what was on the old galvanized tank system? Right, the check valve. We dug the used check valve out of the garbage, installed it in the system, and it worked like a charm. See, just because something looks old and worn out, doesn't mean it is.

Some may look upon elderly people and say "they are old, can't keep up", but in all fairness, it is those people who know how to get the job done with less effort or mistakes because of all those years of experience.

So, let's not discard someone or something that looks old and weathered, when we may just need that very valuable insight or part after midnight when we have no water and a house full of people.

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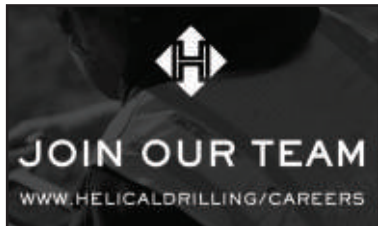
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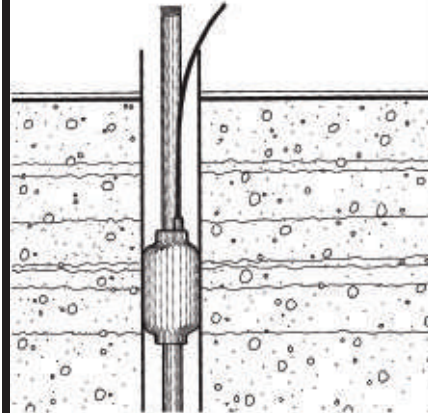
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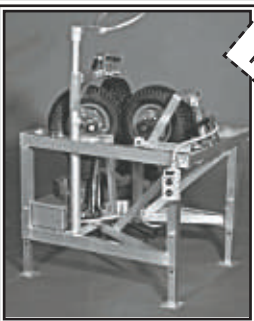
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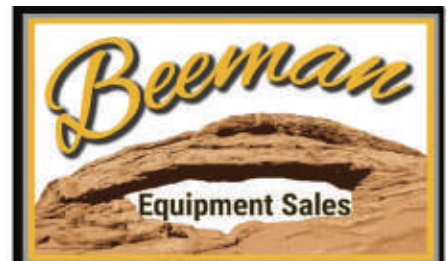
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1999 International 4800, DT466E, 4x4, automatic, Foremost Mobile B-59, Cummins 3.9L (110hp) aux. diesel w/880 hours, ex-California city truck, well maintained, 361 total truck hrs., ECM verified 7850 miles.....**\$149,500**

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Contact Chip Nelson
for more information
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~ Georges Jacques Danton

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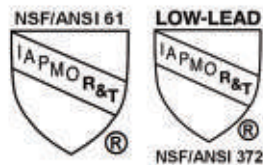
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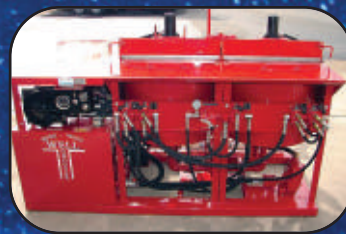
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