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**This could be
your last issue.**

**See back cover for
important information.**

The *WWDR* Team



Ronnie,
Managing Publisher
[ronnie@](mailto:ronnie@worldwidedrillingresource.com)
With pen (computer) in hand...

There was a song . . . my favorite for as long as I can remember, *Time In A Bottle* by Jim Croce. The song says a great deal. Listen to it, for it is so true.

My time in a bottle now is to ensure the **WWDR** Team remains the world's best team for they do have you, your future, and the future of the drilling industry utmost in their hearts and minds. They are not afraid to answer your questions. If they don't know the answer, they will

get the answer for you, and get back with you ASAP.

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Check out Breaking News this month! You asked ~ We listened!

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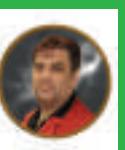
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Telephone: 850-547-0102

Fax: 850-547-0329

E-mail: wwdr@worldwidedrillingresource.com

Website: www.worldwidedrillingresource.com



Managing Publisher/CEO/President: Veronica I. "Ronnie" Jones
Vice President: Troy Cunningham
Office Administrator: Michele Stevens
Editor: Bonnie Love
Associate Editor: Caleb Whitaker
Public Relations Professionals: Brenda Helms Jan Allen
Betsy Willett Kathy Heinrich
Production/Webmaster: Marcel Schimpf
Representative: Marie Cunningham

Editorial Contributors for this month:

Mark Battersby	John Christ	Tim Connor	Bill Corey
Jim Kuebelbeck	Thomas Kwader	Tim Rasmussen	"Billy Bob Smith"
Britt Storkson	Harold White	Robert Evans Wilson, Jr.	
	Jeremy Wire		
Hyd/Eng Consultant: Thomas Kwader, Ph.D.,P.G.		Consultant: Mary Ann Pelletier	



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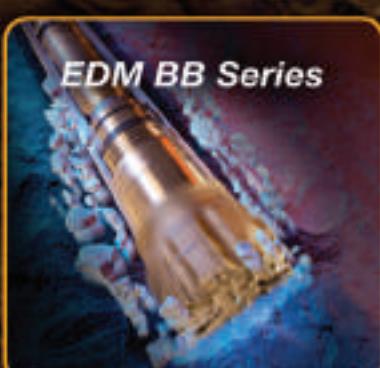
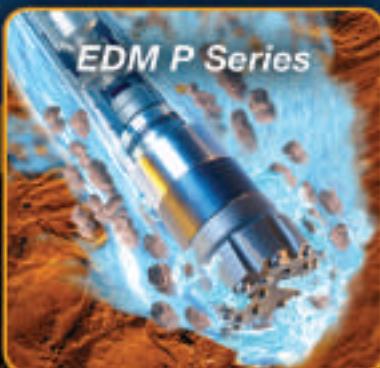
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BREAKING NEWS

WWDR Applies for BPA Membership

WorldWide Drilling Resource® has applied for business magazine membership in BPA Worldwide.

BPA Worldwide will track the company's circulation size, source make-up, pricing, and geographic coverage. The magazine will have 12 months to complete its initial circulation audit. "The strong growth of **WorldWide Drilling Resource®** has made it a perfect time to apply for membership with BPA Worldwide," said Publisher Veronica I. "Ronnie" Jones. "Our firm commitment to recipients and advertisers will be enhanced by our future membership in BPA."

"We are pleased that **WorldWide Drilling Resource®** has applied for membership in BPA Worldwide," said BPA President and CEO Glenn Hansen. "We applaud the publisher for providing advertisers and prospects with the solid assurance of an independent circulation audit conducted according to our world-respected, uncompromising standards. With a BPA audit, media buyers can be confident that circulation claims are accurate, and that they have the verified data that they need to assess a publication's effectiveness in serving its market."



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WHO'S IN THE NEWS



Recently, the Michigan Ground Water Association (MGWA) announced A&B Webb Enterprises as its 2016 Distinguished Business Award recipient. Robert Webb II received the 2016 Distinguished Service Award.

Look for additional announcements from Terra Sonic International and GZA GeoEnvironmental, Inc. online at worldwidldrillingsource.info/Whos6-17.pdf



Robert Webb III accepted the Distinguished Service Award on behalf of his father.

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

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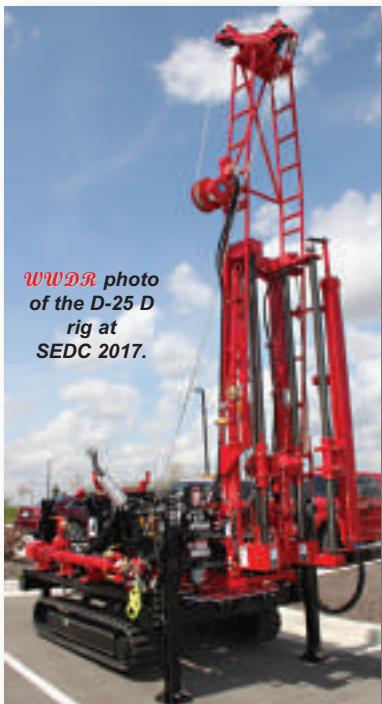
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Hot Off the Press

New and Improved D25-D Rig

Making several upgrades to the previous model, Diedrich Drill redesigned and relaunched the D-25 D drill rig at the recent Shallow Exploration Drillers Clinic (SEDC) in Olathe, Kansas, with **WWDR** to share in the excitement.

The improved rig offers numerous upgrades. Its redesigned hydraulic layout features a new control panel, valve banks, and hydraulic tank. The light-weight, compact drill also has a low-clearance feed frame.



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The Un-Comfort Zone II

by Robert Evans Wilson, Jr.

I was Motivated by Nostalgia until Good Sense Kicked in

Recently, I was having lunch with my cousin Lucy in a trendy section of Atlanta known for its variety of restaurants, bars, and unique shops. We were dining by the window when I noticed something across the street I'd always wanted to try.

It was a contraption known as a penny-farthing. It was the world's first bicycle; invented in 1870. Oh, there were other vehicles with double in-line wheels before this one, but they were coaster bikes you propelled like Fred Flintstone, by pushing your feet against the ground. The penny-farthing was the first one on which you could mechanically propel yourself by pedaling.

As a biking enthusiast, who also has a strong sense of nostalgia for the olden days, I've always wanted to ride one, but I'd only seen them in pictures. You've probably seen a picture of one before - it's the original big-wheeled bike. Giant wheel in front with a tiny wheel in back. It's how it got its name; it reminded someone of a penny next to a farthing (an old British penny and quarter penny - you can look them up; I did, but after seeing the proportions, I thought "silver dollar-dime" would've been a better name).



This one was on display in front of a bicycle store. After we finished eating, we crossed the street for what I hoped was an opportunity to scratch an item off my bucket list. Lee, the shopkeeper, was happy to tell us all about it, but first he said it wasn't for sale or rent. Wah! He explained it had been brought in for repair three months earlier, but the bike's owner hadn't returned to pick it up. Hence, he turned it into a display item to attract people into the store. It sure worked on me.

These bikes have been out of production since 1893, mostly because they are mortally dangerous. The rider's body weight is centered over the big front wheel, and if the wheel hits a pothole, the rider is thrown head first over the handlebars. Unfortunately for those early adopters, bike helmets weren't invented until the mid-1970s.

This penny-farthing had been custom built, and it stood as tall as a man. Lee helped us get on it. He held it steady, while we took turns climbing into the seat. It was way higher than I had imagined. My foot at its lowest extension was still 2½ feet off the ground. There was no way I could touch the ground with my toes, which made me curious. How would I actually get on it if Lee wasn't there?

Lee explained you had to run alongside it, put your foot on the small step conveniently placed just above the rear wheel, then launch yourself onto the seat (sort of like rodeo cowboys do when they leapfrog onto a horse from behind), all while trying to grab the handlebars (which are too high and far from the back to hold while running), getting your

Wilson cont'd on page 30.

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water for life

by Tara, submitted by Tim Rasmussen

My trip to Guatemala was one I will never forget. My name is Tara, I am 15 years old, and have a passion for mission trips and traveling. I first heard of Water For Life through my dad Adrian, who is a well drilling contractor and pump specialist. I went to Guatemala in January 2017, with my dad and brother Tanner, who is 13 years old.



We stayed at ICAP, which is a school. I got to play with the teacher's children and the students who go to the school. We would play sports and talk almost every day. I really got to know them quite well. I would get to help people learn English, and they attempted to teach me Spanish, which generally ended up with them laughing at my pronunciation.

My dad and brother drilled while they were there, and I went with them one day. The drilling there takes a bit longer than here in Canada, because the ground is a lot rockier and has more limestone. The people asked what we were doing there. When we told them we were drilling wells, then we got to experience the look of joy and thankfulness on their faces. That in itself is something I think everyone should get to experience; their reactions were amazing, and it warmed our hearts. People would walk by and try to talk to my dad and brother, and when they realized they didn't speak Spanish, they communicated in some other way how thankful they were, and they would watch them drill.

One day I got to go out and drill with two other guys from our group, Mike and Ed. We went to drill in a village. This was probably my favorite experience I got to have there. They had just started drilling a few days ago. I got to drill for a bit and then I started handing out bracelets and toothbrushes to all the children who were gathered around watching. We then started playing with the footballs I had brought. As the day progressed, I got to make friendships with the children. They then very proudly showed me their houses and their moms, who were all very friendly and wanted to share what they had with me. These people have so little yet are so willing to share.

Every day there is a swarm of people watching the drill, and they stay there all day. When the guys pack up to leave, they have a guy there all night watching the rig to make sure no one takes anything or damages it because they really need the water.

Another one of my favorite things was going into Poptun to see the townfolk and learn how they live. Getting to experience it was cool. I even got to experience riding in a tuk-tuk [three-wheeled motorized vehicle].

On this trip, I made many amazing friendships and met a bunch of different people. They will always be remembered fondly. I didn't just get to make Guatemalan friends either, the team we had down there were also a big part of my experience. I got to learn a lot about them and from them, and for that I am grateful. I am so thankful for what God and Water For Life is doing to help the people in Guatemala. I would encourage people to see what they can do to help this wonderful organization and these amazing people. Even if it might seem small, it can help; everything is useful.

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
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Adapted from Information by Industrial Test Systems, Inc.

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What is WIM and WIMEF?

by Bonnie Love, Editor
WorldWide Drilling Resource®

I was first introduced to Women In Mining (WIM) through our Managing Publisher Veronica I. "Ronnie" Jones in 2010. That year, the WIM National Meeting was held in Golden, Colorado, and I was covering the event for **WWDR**. It was at this meeting, I was introduced to Arloa Woolford and the WIM Education Foundation (WIMEF). As I sat in on the National Meeting, I was exposed to a world I didn't know existed. It was a world filled with people dedicated to educating the public and students of the importance of minerals and mining. WIM is a national organization of mining professionals who volunteer to promote the mining industry all over the country. There are several local chapters, and each chapter operates as its own entity under the umbrella of WIM National, which consists of two members of each chapter. During the national meeting, everyone discusses what each of the chapters has done throughout the year. We discuss industry topics, regulations, and of course, education.

WIM was originally founded in Denver, Colorado, in 1972. Three women contacted various mining companies to see if there was interest in creating an organization to educate the public about the industry. The interest was definitely there, and WIM has been actively educating people ever since.

It wasn't until 1991, when the need for educational material for teachers was intensified. While staffing a booth for a National Science Teacher Association convention, visitors flocked to the WIM booth. Teachers wanted and needed information in a simple and inexpensive form. Along with requests for materials, numerous inquiries about providing workshops to demonstrate how to use the activities were received. It didn't take long for the WIM National Board to realize a formal education arm was necessary to keep up with the demand. Between 1991 and 1993, the group worked hard to establish a nonprofit organization with the sole purpose of educating others about the importance of the minerals industry. WIMEF was granted 501(c)3 status by the Internal Revenue Service in 1993.

Arloa was one of those members spearheading the creation of WIMEF, and her passion was evident to anyone who met her. During our initial meeting in 2010, we spoke for hours about the activities and events the foundation attends and how they travel to schools and teachers conferences to bring the minerals industry into the classroom.

Using mining-based activities, WIMEF members provide teachers with the tools to enlighten children on basic science, technology, engineering, and math (STEM) skills.

In 2012, Arloa asked if I would be interested in joining the Board of Directors for WIMEF and I didn't hesitate to say YES! Since then, I learned a great deal about the industry and actually became vice president of the foundation in 2015. Sadly, we lost Arloa earlier this year, and the foundation is in need of new board members. We are looking for people who share our passion for education and the minerals industry. If you are interested, or if you would like more information, visit the WIM website.

Don't let the name fool you! WIM is always looking for new members of any gender.

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www.womeninmining.org

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Drilling on Mars Reveals Hematite and Boron

Adapted from Information by the National Aeronautics and Space Administration

The National Aeronautics and Space Administration, more commonly known as NASA, has been studying the mountains and surface of Mars with its Curiosity rover since 2012. The mission's main goal is to determine if the Martian environment

could sustain microbial life. Although the rover has discovered evidence of how ancient lakes and wet underground environments changed billions of years ago, they have not found out whether life has ever existed on Mars - yet. They have, however, discovered the elements necessary for life.

Hematite, clay minerals, and boron are among the ingredients found to be more abundant in layers farther uphill, compared with lower, older layers examined earlier in the mission. Scientists are trying to figure out what these and other variations mean about the conditions when the sediments were initially deposited, and how groundwater moving through the accumulated layers altered and transported them.

Groundwater movement is apparent in the mineral veins which form where cracks in the sediment layers become filled with chemicals which have been dissolved in groundwater. It is also obvious the water, with its dissolved contents, interacted with the rocks surrounding the veins, altering the chemistry both in the rock and water. "There is so much variability in the composition at different elevations, we've hit a jackpot," said John Grotzinger, of Caltech in Pasadena, California. As the rover examines higher, younger layers, researchers are impressed by the complexity of the lake environments when clay-bearing sediments were being deposited, and also the complexity of the groundwater interactions after the sediments were buried.

Gale Crater's main appeal is geological layering exposed in the lower portion of its central mound, Mount Sharp. These layers offer access to rocks holding an environmental record of conditions during different stages of the planet's history, each layer younger than the one beneath it. The mission has already discovered an ancient Martian lake environment with all the key chemical ingredients needed for life, plus chemical energy available for life. Now, the rover is climbing lower on Mount Sharp to investigate how ancient environmental conditions changed over time.

Drilling on Mars cont'd on page 24.



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Just Because We Can Do It, Doesn't Mean We Should Do It

by Britt Storkson

Owner, P2FlowLLC

The Concorde supersonic transport (SST) went into service in 1976. A fatal accident in 2000 spelled the beginning of the end of the Concorde, but the accident wasn't what ended its career. The reason we don't have commercial supersonic air travel today is because it isn't economically viable. The SST never made any money. While supersonic air travel is indeed possible, it just isn't practical. Paying over five times the airfare to save three hours on a flight from the U.S. to Europe did not compute for most air travelers.

The Concorde cost almost \$11 billion in today's dollars to develop and build, and was nearly 10 times over budget. It used about 4 times as much fuel per passenger to cover the same distance. It was nothing more than a very expensive toy and a huge drain of tax dollars from the French and British taxpayers who funded the thing. The SST didn't even recover its development costs, much less turn a profit. And the SST designers knew this was going to be the case long before it got off of the drawing board.

This drives home the point: Just because we can do it, doesn't mean we should do it. Many things are possible, but not everything is practical. In fact, with computer controls, adding little used or poorly understood components can cause more problems than they solve because added complexity adds cost and unreliability.

Also, the more complex the equipment is, the more likely the operators - even very skilled and competent operators - are to make mistakes. Then there's the learning curve. If you pay an employee to learn one or more computer systems, wouldn't you rather the employee be able to learn the system in one day or so, instead of needing one month or more for adequate comprehension?

I can cite many examples, but I'll use the average automobile as a case study here. The modern automobile is a complex machine with many different systems onboard. We have heating, cooling, gear drive, and fuel systems, and on and on. There are many things which could be monitored on the average car, such as fuel pressure, transmission temperature, wheel bearing temperature . . . you get the idea.

On a car, we could have a dashboard with 20 or more gauges or indicator lights to advise us of what the car systems are doing, but we don't. Why? First and foremost in almost every manufactured product is COST. It costs money to install these indicators, and the objective is to get the most money relative to the cost input. Secondly, with things like wheel bearing temperatures . . . wheel bearings so rarely go bad, the sensor would probably fail before the wheel bearing did. Thirdly, the average car driver probably

Storkson cont'd on page 60.

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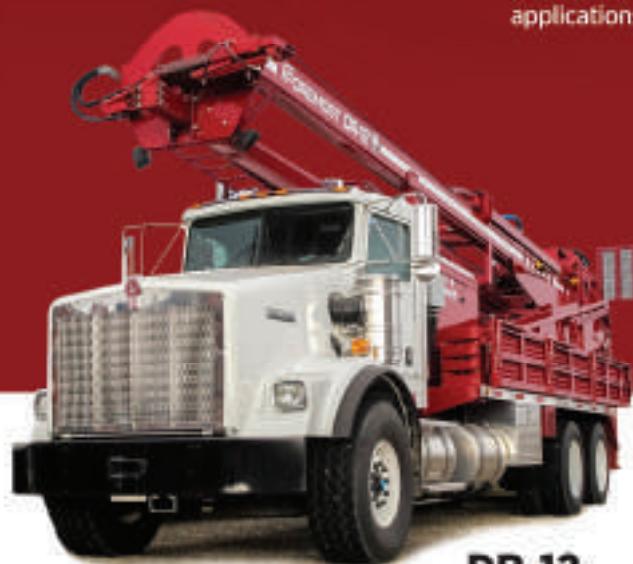


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The Permian Basin ~ Proof that Everything is Bigger in Texas

Adapted from Information by ExxonMobil Corporation

With the recent increase in natural gas and oil production in shale regions across America, the United States is now the world's largest producer of energy from oil and natural gas. Besides sounding impressive, the bigger implication is the contribution it provides to America's energy security. Texas plays a big role, and has for more than a hundred years, thanks in no small part to bountiful reservoirs inside a sedimentary formation known as the Permian Basin.

Here are five key things about one of the world's most exciting oil and natural gas plays ~ The Permian Basin:

First oil - Wildcatters were producing oil in the Permian Basin long before the "shale gale" blew in. The basin's first commercial well, T&P Abrams Number One, came online in 1923, and wasn't capped until 1990. The Yates Field, where oil was first discovered in 1926, still operates today, producing more than 7.4 million barrels annually.

Proven reserves - Growing shale oil production has turned the Permian Basin into one of the country's most promising oil regions. According to the most recent Energy Information Agency's (EIA's) assessment, the Permian Basin holds 722 million barrels of proven reserves, more than twice the number registered in the EIA's 2013 U.S. reserves estimate.

Critical plays - Driving much of the Basin's new production are the Wolfcamp, Spraberry, and Bone Spring Formations. Together, they generate nearly half of the Permian Basin's output.

Drilling innovations - Drilling innovations are at the heart of the Permian renaissance. For much of its history, oil was pumped out of easy-to-access reservoirs through standard vertical wells. Oil production from shale or tight rock formations wasn't part of the equation until the horizontal drilling and hydraulic fracturing technology used to produce shale gas was customized to extract oil locked inside.

Annual production - This brings us to the Permian Basin's annual production. In 2008, daily output averaged a little more than 710,000 barrels. However, in 2015, production in Texas nearly doubled from 2008 levels, averaging more than 1.3 million barrels per day. While the fall in oil and natural gas prices could moderate production, the Permian Basin is expected to continue to play an important role in helping meet domestic demand with reliable and affordable energy, while also helping decrease dependence on imported sources of energy.



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The "Idiots" Corner

by "Billy Bob Smith"

Fake News

I don't know about you, but I have had it up to my ears with all of this fake news. I am wearing out my TV remote so it hardly works anymore. What happened to truth? Are all we are going to get now is what some people want the truth to be, rather than what it is? The media, protesters, government employees, college professors - I have had enough of their bull____ and what they want to be truth, act like is true, may believe is true, and try to get me to believe is true. Not working, you idiots - I am smarter than you think I am.

I could give you hundreds of examples, but I'll bet you too have had enough. These people are all idiots - maybe they are big fans of this column - nah, I doubt it - they are all too busy making stuff up. Here are a few of the bigger ones that drive me nuts.

But first, a couple of definitions for you idiots out there like me: Fake = forgery, counterfeit, copy, pirate(d) copy, sham, fraud, hoax, imitation, mock-up, dummy, reproduction, phony, rip-off, knockoff, dupe. News = information about current events. Journalists provide news through many different media, based on word of mouth, printing, postal systems, broadcasting, electronic communication, and also on their own testimony, as witnesses of relevant events. (Note that truth is not included in this definition. No wonder we have fake news issues!)

There are over 250 fake news websites listed - here are just two:

1. Don't Be Fooled! A Guide to Fake News Websites: <https://www.thoughtco.com/guide-to-fake-news-websites-3298824>
Satire is a venerable form of social commentary using humor to ridicule human vices and follies. The Internet is rife with it, especially news satire, or fake news in which fictionalized accounts of current events are presented in mock-journalistic style to lampoon politicians, celebrities, and social mores.

2. Snopes' Field Guide to Fake News Sites and Hoax Purveyors: Snopes.com's updated guide to the Internet's clickbaiting, news-faking, social media-exploiting dark side.

Here are just five fake news stories. There are literally tens of thousands of these types of stories worldwide, and we wonder why people have stopped trusting these idiots!

1. Kim Jong Un is the Sexiest Man in the World.
2. Every Style of Parenting Results in Miserable Adults.

3. As fake news stories go, this is about as brazen as it gets, considering how easily it could be debunked. Undeterred, an NBC News imitation site claimed in October the Republican presidential nominee had died of an apparent heart attack.

4. An FBI agent investigating Clinton died under suspicious circumstances.

A fake news site called the *Denver Guardian* recently published a fabricated story about an FBI agent who had been found dead, along with his wife, in a Maryland town which does not exist.

The story said officials were calling the episode a murder-suicide, but floated the idea "this was another hit job by the Clintons in retaliation for the FBI e-mail leaks so close to the presidential election."

Had enough? I know I have! Have a wonderful fake news month . . .

Billy Bob

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

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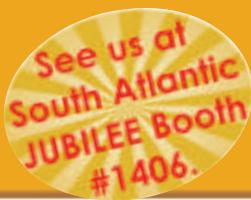
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Anhydrite is an evaporite mineral occurring in extensive layered deposits in sedimentary basins where large volumes of seawater have evaporated. It is typically interbedded with halite, gypsum, and limestone in accumulations up to hundreds of feet thick.

Closely related to gypsum, anhydrite's name comes from the Greek word anhydrous which means "without water". It converts to gypsum under humid conditions, or when it is in contact with groundwater. This transition involves the absorption of water and a significant change in volume. Conversely, if gypsum is heated to about 390°F (200°C), the water will evaporate and it will convert to anhydrite.

Anhydrite is used as a drying agent in plaster, paint, and varnish. It is also used along with gypsum to produce plaster, joint compound, wallboard, and other products for the construction industry. Anhydrite has also been used as a source of sulfur in the production of sulfuric acid.

Hydrofluoric acid is produced using fluorite and sulfuric acid and for every ton produced, about 3½ tons of synthetic anhydrite is produced. For decades, synthetic anhydrite was considered a nuisance product for disposal, but now it can be dried in a kiln and used for producing cement, plaster, and flooring, as well as used as a filler in the production of plastics and paper products.



Antimony was named after the Greek words anti and monos which means "a metal not found alone." Antimony is not abundant, but it is found in over 100 mineral species. Although it is considered a native element which can occur in a natural state, it is rarely pure and almost always contains arsenic, and may also contain traces of silver, iron, and sulfur. Antimony and arsenic are almost identical. In some cases, complex scientific tests are the only way to tell them apart.

The natural sulfide of antimony was used in Biblical times as medicine and as a cosmetic. Today, the pure form of antimony is used to make certain types of semiconductor devices, such as diodes and infrared detectors. An alloy of lead and antimony is used in batteries, low-friction metals, small arms, and tracer bullets, cable sheathing as well as other products. Other compounds of antimony are used to make flame-proofing compounds, paints, ceramic enamels, glass, and pottery. It is also used for medicinal research and as a dye to color glass.

The majority of antimony is consumed in the production of antimony trioxide, the compound used in flame-retardant materials such as children's clothing and toys, as well as aircraft and auto seat covers. When combined with halogenated particles, it suppresses, reduces, or delays the spread of flame. It is incorporated into adhesives, paints, plastics, rubber insulation, decorative foams, building materials, and textiles, including upholstered furniture.



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Oil/Water Exploration

by Harold White



Drilling a well is a hit-and-miss project. I do not drill wells just anywhere out in the fields. There are a lot of dry wells drilled this way, and lots of them are within a short distance to a creek. I compare drilling a well anywhere out in a field to a diving board just anywhere out in a field. If you build a diving board, you would build it at a known place, where there is enough water.

I find a place there is water enough for the type of well I want to drill. To do this, I find where some underground creeks cross over and under each other. I know where the water is, and I have more than enough.

When I am drilling irrigation wells, I try to find the big creeks which can sustain 1000 gallons per minute or more. First, I find a place where a lot of creeks cross and mark the spot. Then I mark the direction of each creek to find out how many, if any, would do the job. If not, I continue this over and over until I find one creek which will produce 1000 gallons per minute. I have been doing this very accurately since about 1953.

Finding a location for a stock well or house well is a lot easier. I also find oil, gas, hot water, saltwater, and sulfur water creeks. Understandably, what I am writing has been, and will be, met with great resistance from scientists of the day.

When I was 15 years old, I was told by some eastern college professors I was at least 50 years ahead of my time with what I was doing. They hadn't seen anything like it before, and had been studying water finders for years. Recently, I was told again I was 50 years ahead of my time. So I said, "Are you teachers all taught to say the same thing?"

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 WWDR.

Harold

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

Drilling on Mars cont'd from page 17.

The rover's laser-shooting chemistry and camera instrument has also been detecting another ingredient in recent measurements - the element boron. "No prior mission has detected boron on Mars," said Patrick Gasda of the U.S. Department of Energy's Los Alamos National Laboratory, Los Alamos, New Mexico. "We're seeing a sharp increase in boron in vein targets inspected in the past several months."

So what is the source of the boron-laced groundwater in the mineral veins? Scientists are considering at least two possibilities. Perhaps evaporation of a lake formed a boron-containing deposit in an overlying layer, not yet reached by Curiosity. Water could have later redisolved the boron and carried it down through a fracture network into older layers, where it accumulated along with fracture-filling vein minerals. Or it's possible changes in the chemistry of clay-bearing deposits, such as evidenced by the increased hematite, affected how groundwater picked up and dropped off boron within the local sediments.

One clue to changing ancient conditions is the mineral hematite. It has replaced less-oxidized magnetite as the dominant iron oxide in rocks Curiosity has drilled recently, compared with the site where Curiosity first found lakebed sediments.

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WWDR photo.

ATF Answers Questions for the Drilling Industry

Adapted from Information by the U.S. Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF)

Question: When referring to the transfer from the drilling company to the geophysical company, does this refer to when the geophysical company takes control of the buried charges to begin setting up to detonate the materials?

Answer: Yes. When a geophysical company arrives at a site and takes control of a site, or a portion of it, the company receives the materials. This change of control over the explosive material is a distribution and requires the drilling company have a dealer's license and maintain records of distribution as required under 27 CFR § 555.124.

Question: Does each employee of a drilling company need their own separate dealer's license?

Answer: No. The drilling company would maintain a federal explosives license (FEL) and the individual drilling professional/employee would work as an Employee Possessor (or Responsible Person) under the license.

Question: We have been operating under our company's User Permit for our drilling operations, do we need to change this to a dealer's license now?

Answer: You typically would need a dealer's license to conduct these explosives distributions. However, because the ATF (Bureau of Alcohol, Tobacco, Firearms, and Explosives) only recently clarified this issue, ATF is not requiring drilling companies with permits immediately acquire a license instead. Rather, companies may wait until the next renewal to make the change. However, you should immediately begin to maintain the records required under 27 CFR § 555.124.

Question: After we drill the shot hole and load the material at the bottom, the void is plugged and filled. The drilling company then tests the detonator wires, but there are times when the geophysical company comes back later to detonate the charge and discovers the detonator will not initiate the charge, or the path to the detonator has been damaged. What do the regulations require the geophysical company do with the charge that will not initiate?

Answer: The regulations don't specifically address charges that don't initiate. However, ATF provided some guidance on *How to Address a Loss in the December 2014 ATF Explosives Industry Newsletter*. It reads, in part, *Explosives licensees and permittees must complete and send an ATF Form 5400.5, Report of Theft or Loss - Explosive Materials to ATF as well as notify the local authorities, under the following examples . . . If the materials cannot be retrieved because they are inaccessible, and all attempts to retrieve and/or destroy the materials*

ATF Answers cont'd on page 34.

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A New Frontier for South Korea

Compiled by Caleb Whitaker, Associate Editor, *WorldWide Drilling Resource®*

South Korea doesn't have a rich geothermal history because the country does not have high enthalpy geothermal energy sources related to volcanic or tectonic activities; instead, the geology of Korea is characterized by old formations of very thin sedimentary layers. However, there are some regions which deviate from the norm, showing a high geothermal gradient. Pohang is one of these regions, reaching nearly 360°F (180°C) at a depth of three miles. For comparison, a typical volcanic area reaches temperatures over 300°F (150°C) at a depth of almost a mile.

The Pohang Enhanced Geothermal Systems (EGS) project began in 2010, as the first of its kind in Korea, with the hopes of producing one megawatt (MW) of electricity. The project is run by a consortium of six industry, research institute, and university research teams and financed by sources from South Korea. The site will be available for "demonstration of soft stimulation treatments of geothermal reservoirs" (DESTRESS) tests, performed by the DESTRESS consortium. The two scheduled tests will be complementary and add great value to the project.



*The Pohang EGS project drill site,
Courtesy of DESTRESS.*

Since there were not any deep drilling operations in South Korea prior to the project, the drilling rig utilized was purchased by project manager NEXGEO Inc., from the Chinese company Guanghan Jincheng Petroleum Machinery Co., Ltd., who also contracted all the crews to operate the drilling rig. The rig used was rated for drilling to 16,400 feet, making it sufficient for drilling the wells in Pohang.

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The project was divided into two stages. In the first stage, covering the first two years, geothermal exploration at the site was conducted, involving drilling to a depth of nearly two miles to figure out the geology of the area and find temperatures in excess of 210°F (100°C). The second stage was devoted to completing the geothermal system to a depth of just over three miles, which included deep drilling, directional drilling, hydraulic stimulation, and circulation tests.

Drilling on the first well started in 2012, reaching a depth of nearly 7400 feet and temperatures over 210°F (100°C) at the bottom of the well. The following year, the well was enlarged to the target depth of nearly 15,000 feet. In 2014, drilling of a second well to the same target depth was commenced, then completed the following year with directional drilling. The 1.2-MW project is expected to provide electricity to an estimated 1000 households as early as this year. Upon the first successful supply of geothermal electricity, officials will raise an additional \$80 billion through a power plant consortium to expand the current facility for the purpose of generating 6.2 MWs by 2019.

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Ronnie's Real World

June is upon us and things are looking up for the "working class". That would be you, and us here at **WorldWide Drilling Resource, Inc.**

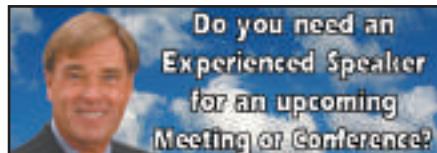
Tax Day is behind us, well, for most of us anyway. Planning time for our future is NOW! Not a moment to wait or you will be left behind. Believe me, it is true. When we first started **WorldWide** in its earliest days, we realized we needed to get our information out early so everyone would know they had another choice and this one would encompass all areas of drilling. After all, drilling can cross over; it's one industry that actually DOES have a FUTURE!

I've been in this industry with the best since 1995, and have the best people in the industry -The **WWDR** Team - working hard for you.

We have some exciting news for you in this issue; and be sure you get ready for new and aggressive ways we can prove our **Solid Gold Service ~ with a Smile™** to you. Be sure to ask what's coming up!

Next issue will give you more insight . . .

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



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Make Sure Your Customers Have Constant Water

Adapted from Information by Constant Water

It's that time of year again, hurricane and storm season is upon us. Are your customers storm ready? What happens when they lose electricity? If they are like most water well owners, they also lose access to their water supply when the power goes out. Constant Water can help. The Constant Water system activates automatically when the power goes out, providing 40 gallons of pressurized water (up to 120 gallons with additional tanks), using a rechargeable, battery-powered control unit. Designed to use a small amount of space, the basic system consists of a water storage tank and a wall-mounted control unit.

With the system's in-line plumbing approach, the 40-gallon tanks are always full and the water is always fresh. It is a closed system, so airborne contaminants cannot come in contact with the stored water. Once plumbed into a home or building's existing water line, the system can provide pressurized water throughout the building - every sink, toilet, shower, and tub. When power is restored, the system automatically resets, recharges, refills, and is ready for the next outage.

The system offers benefits to the well drilling professionals as well. First, it is a new and needed product which can be added at the initial installation of a well, or retrofitted into existing homes. It solves a known problem experienced by every well owner. "Every well user will experience power failure and/or failure of the well pump. It's just a matter of time," said Judd Walls, founder and CEO of the company. "Constant Water reduces the 'emergency' of both of these events."

Second, it gives service providers an opportunity to call existing customers and offer them a new product to solve a known problem. "Whenever you can follow up with your existing customer base, you have an opportunity to meet a need and be recognized as a company that keeps up with important technology," Walls stated.

Lastly, it's an opportunity to differentiate your service from your competition. Explaining both the benefits and limitations of a water well to customers builds their trust in you. Providing a solution to the challenges they experience demonstrates your concern for them.

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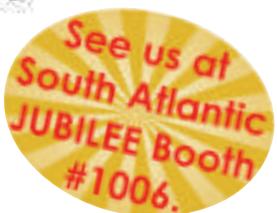


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To celebrate our 100th year in the drilling industry, we are releasing a game-changing new drill rig - the Acker REBEL. The design of the REBEL is based on many years of drillers' feedback. Our most common request was for a compact drill rig with incredible versatility and power, which the REBEL achieves. AND...with the REBEL you will no longer lose bids due to lack of angle drilling capability or clearance. Many said this package could not be done, but the REBEL is here and it hits the sweet spot on all fronts.

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Directional Drilling for Geothermal Power?

Adapted from Information by the U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy

Directional drilling has gained a lot of popularity in the drilling world. It makes utility replacement easier, and is being used in the gas and oil industry for hydraulic fracturing. So, what about the geothermal drilling industry?

When it comes to geothermal energy, there is an immeasurable amount of energy lying beneath our feet. Not only is this energy renewable, it is also nearly free of emissions. One of the problems with developing geothermal resources is the immense heat encountered in the deep subsurface which makes it a difficult environment to work in. Engineers seeking to tap geothermal resources often encounter extremely high

temperatures, extreme pressures, and crystalline rock formations which can make things complicated. This is where highly advanced drilling technologies and techniques, pushing the envelope of what can be achieved in conventional drilling operations, come in.

Baker Hughes Incorporated, with investment from the U.S. Department of Energy's Geothermal Technologies Office (GTO), recently developed and successfully demonstrated an advanced drilling system designed for these critical conditions. This technology can drill directionally at extremely high temperatures (over 570°F / 300°C). The system uses a high-temperature lubricant in the drilling fluid, a full metal drill bit to break the formation, and a full metal drilling motor known as a metal-to-metal motor. Recently, Baker Hughes successfully directionally drilled with this innovative system in a deep geothermal well. In fact, the metal-to-metal motor operated for a continuous 270 hours - the longest time a system like it has ever operated.

Due to its reliability in extreme subsurface conditions, the successful operation



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of this drilling system could have major impacts. Not only does this technology advance the state of geothermal technologies and open more geothermal resource areas for development, other subsurface sectors such as fossil and nuclear energy are ready to embrace the recent development. These sectors can leverage the work funded by the geothermal energy sector.

The energy resources this breakthrough could make available to developers will be immense and difficult to calculate, and the potential economic impacts are currently undefined. Expanding EGS (Enhanced Geothermal Systems) alone could eventually lead to more than 100 gigawatts of economically viable electric generating capacity in the continental United States - enough to power more than 100 million homes.

As the geothermal, oil and gas, and nuclear industries adopt this cutting-edge technology throughout the nation's energy portfolio, Baker Hughes and GTO's research in drilling technology could help the nation on a path toward improved energy security and a stronger economy.

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If you're wondering why these bikes had such a big wheel (typically between 55 and 65 inches in diameter), it was to give them more speed. The bigger the wheel, the faster it would go. The penny-farthing did not have a chain - it was direct drive propulsion - which means the pedals were fixed to the wheel. Think about this for a moment. It means as long as the wheel was turning, so were the pedals. When you rode downhill, you had to take your feet off the pedals because they would be going around too fast for your legs to keep up. Back in the day, most riders put their legs on top of the handlebars while going downhill. Why? Because if they hit a bump and were thrown over the handlebars, they would land on their feet instead of their heads. Oh, one more thing, most of these bikes did NOT have brakes.

NO BRAKES? It leads me to one conclusion: These bikes were designed to be ridden in cities with flat roads and no hills. This pretty much eliminates my hometown of Atlanta, which of major U.S. cities is second in elevation behind Denver, which means there are no flat roads to ride on. Here in the foothills of the Appalachian Mountains, the only way we can get a flat surface to bike on is to pave over an old railroad bed.

Despite all I learned, I still want to ride a penny-farthing. I just want to do it where the roads are flat, traffic is light, and before I have to worry about breaking a hip. So . . . what's on your bucket list?

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@worldwideweldingresource.com

feet on the pedals, and maintaining your balance so you don't fall over. If the bike does fall over, then you get to start over . . . albeit sorer from the bruises and abrasions you got while body slamming the pavement.

I'm thinking the average rider, in the 1880s when these bikes were most common, may not have had to go through all those gymnastics. Most houses and buildings had carriage blocks so people would have a step between their horse-drawn vehicles and the ground. These would have been a perfect height for climbing on a bike and pushing off. Then again, most of the people riding these bikes were athletic young men in their 20s and 30s who would've looked at me in contempt for even considering using a stepping stone. Okay, I'm a few decades past my 20s, which is my sole excuse for even thinking of it.

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Railroad Commission of Texas Streamlines its Process

Adapted from a Press Release by the Railroad Commission of Texas

In an effort to increase efficiency and transparency, the Railroad Commission of Texas announced oil and gas producers can now file well log data electronically. The commission now has the technology to begin accepting well log information electronically, so operators won't be required to print and submit paper logs.

This new electronic filing system is expected to save operators about \$362,000 annually. More importantly, the system should also reduce the time and resources necessary to comply with reporting requirements. The information will also be easier for the public to access. The commission is expected to save over \$100,000 and nearly 4000 hours of staff time by eliminating the need for staff to receive the paper copies of these well logs and convert them to electronic files.

"Technology updates such as these help close the gap in day-to-day business operations between government agencies and private business," Chairman Christi Craddick said. "We are bringing more data online to allow for a more efficient solution that saves both the state and industry significant time and money. In turn, that means the generation of further business activity, the creation of more jobs, and a stronger Texas economy overall. We at the commission will continue to do everything we can to drive these pro-business policies forward throughout every aspect of our processes."

Commissioner Ryan Sitton is glad the affordable solution will help modernize the agency and make the process easier on operators. "It made no sense to require operators to provide us information in paper form that they already had in electronic form, so I'm glad we identified this issue and saved both operators and the agency time and money," he stated.

Commissioner Wayne Christian agreed saying, "Reducing the regulatory burden on energy operators in Texas, while making sure we continue to protect the people and environment across our state makes good economic sense for our state. Smart regulation like this keeps operators in the field, Texans on the job, and gives the commission the tools we need to make sure energy production in Texas is done safely and responsibly."

This announcement comes on the heels of another announcement from the commission regarding drilling permits in the state. A total of 1009 original drilling permits were issued in December 2016, compared to 727 in December 2015. The December total included 909 permits to drill new oil or gas wells, 17 to reenter plugged well bores, and 83 for recompletions of existing well bores. The breakdown of well types for those permits issued December 2016 included 267 oil, 57 gas, 612 oil or gas, 62 injection, and 11 other permits.



Commissioner
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In Memoriam

William John "Jack" Rumble

With great shock and sadness, the Ontario Ground Water Association (OGWA) reported the sudden passing of William John (Jack) Rumble on April 3, 2017, at the age of 70. He is survived by sisters Nina (John) and Joanne (Bob), and brothers Don (Joyce) and Garnet.

A hard-working young man, Jack joined his father in the family business, Earl Rumble & Sons, at the age of 15. Eventually, he and brother Garnet purchased the business and continued the company into the next generation, Rumble Water Wells, now owned by Garnet and his sons Garnet Jr. and Bill.

An honorary member of the OGWA in recognition of his years of service to the groundwater industry, Jack was ever wise and practical counsel in the days of writing legislation, and leaves a void in the drilling knowledge base of Ontario.

He was a kind and compassionate gentleman who would give the shirt off his back to anyone who needed it. He loved going to auctions, seldom leaving without a new project to tinker on. He enjoyed early morning visits to the coffee shop with friends. Wanting to see the world, Jack managed to go many places, but did not make it to the Panama Canal, which was one of his dreams. Regardless, he always said no one should be sad when he passed; and he wouldn't be sad himself because he had a wonderful life.

The management and staff of **WWDR** express their sympathies to Jack's family, friends, and former colleagues.

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Lest we forget...

ATF Answers cont'd from page 25.

have failed. For example, explosives that failed to function in a shot hole and cannot be retrieved by the operator. Therefore, if the geophysical company cannot safely retrieve the explosive materials from a shot hole, the ATF suggests they cut the leads to below the ground's surface so there is no indication unused explosives are present. Any company facing these circumstances must also report the loss to ATF (by calling I-800-ATF-BOMB), submit ATF Form 5400.5, Report of Theft or Loss - Explosives Materials, and contact the local authorities.

Question: A geophysical company will often detonate charges at a site for several days or longer. Based upon the above question and answer, if the company experiences a misfire or cannot locate an undetonated shot hole (and therefore the explosives remain in the ground), the company must report this as a loss. When must the geophysical company report the explosives in shot holes they failed to locate, and all explosives in shot holes which failed to initiate?

Answer: ATF has determined since the charges described cannot be retrieved, they must be reported as losses. Federal explosives laws require the loss to be reported within 24 hours of discovery. ATF understands industry best practices in this type of operation include a final attempt to locate and detonate such charges at the end of shooting at a particular site. In these cases, the discovery of the loss occurs upon the final verification the charges will remain in the ground undetonated.

To Mountain States We Go

by Betsy Willett, Public Relations Professional

WorldWide Drilling Resource®



In February, we attended the Mountain States Ground Water Expo in Laughlin, Nevada, right on the Colorado River. The Expo is hosted by the groundwater and water well associations of Arizona, Colorado, Nevada, New Mexico, and Utah. On arrival, SEMCO's S8,000H pump hoist for sale and Pulstar's P12000 sold pump hoist were already stationed in the front corner of the Aquarius Casino parking lot. After checking in, we met up with friends, and I had the opportunity to discuss recent findings of talcum powder in wells with Ray and Lyn Roerick.

The next morning, registration opened with a continental breakfast made available to everyone. Seminars started off with "Overcoming Costly Added Charges from Your Suppliers and Subs" given by Fred Rothauge. There were several continuing education sessions to choose from and available throughout the day, ending with John Fowler on "Drilling Safely". The majority of the classes were so packed there was barely standing room. During lunch, exhibitors had an opportunity to set up their booths to be ready for the hospitality meet and greet held within the exhibit hall. Once the

meet and greet kicked off, the trade show was extremely busy, with barely enough room to walk. The interaction between attendees and exhibitors was great to see. We ended the night with dinner and the Buck Lively Scholarship Auction and Raffle where several nice treasures were fought over and won. Do you know why it is called the Buck Lively Scholarship? Buck Lively was one of the founders of the Mountain States Groundwater Expo. He helped arrange the very first Expo which took place in Albuquerque, New Mexico, in 1989, and was also on the Board of Directors. Buck was involved in many areas of the water industry, and was well known for providing BBQ at the end of the show on Saturday afternoons. By doing this, he not only provided a meal, but one last opportunity for everyone to connect before returning home. In honor of him and the contributions he made to the Expo, the Buck Lively Scholarship Fund was established in 1998, and all proceeds from the auction and raffle are equally distributed among the groundwater and water well associations involved.

We began the last day of the Expo with a continental breakfast and additional classes. The exhibit hall opened shortly after Jesse Richardson's seminar "Legal Updates and Exempt Wells" ended. A lunch buffet was served, giving everyone another opportunity to network while in the exhibit area. More seminars resumed after lunch and ran throughout the afternoon. The evening was spent eating dinner with friends - lots of laughter, discussions of work, and an explosive meal! How was the fried kale, Ray?

If given the chance, you should attend your state trade show or find one close to you. Why attend, you may ask? It's a great opportunity to visit with manufacturers, suppliers, contractors, and your state groundwater or water well association representatives. You can attend seminars, earn continuing education credits, and walk around the trade show to view new products while also networking with others within your industry. When and where is your state's trade show? Take a look at **WWDR**'s "Where are you planning to go?" for additional information on upcoming conferences, expos, and trade shows.



Attendees participating in seminars while at Mountain States. **WWDR** photos.

Product Spotlight

Numa designed the **Super Jaws® overburden bit** to drill through unconsolidated ground conditions to set casing into bedrock. It can drill a larger diameter hole than the casing, while simultaneously advancing the casing.

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It's All About the Ice

Adapted from a Press Release by Antarctic Glaciers

In the frozen landscape of Antarctica, there is a drilling operation trying to get to the oldest ice cores. To get down to the oldest ice, the ice cores must be drilled near the ice divide located in the center of the ice sheet. This is no small feat for researchers because the ice divide is far from the research bases and ocean, which makes it somewhat difficult to get the large number of people to the drill site. For this particular project led by a group of New Zealand scientists, it took several flights and waiting weeks for the weather to improve for the 12-person multinational team to make it from Scott Base to the Roosevelt Island drill site.

The island is an ice dome, and the ice is grounded on a muddy bedrock approximately 650 feet below sea level. The dome was naturally built over tens of thousands of years as snow slowly accumulated. The ice built up in annual layers which are flat and easy to interpret. Stable ice flow at the island's summit over the past few thousands of years has brought older ice layers closer to the surface. By conservative estimates, some of the bedrock near the surface should be up to 40,000 years old.

Roosevelt Island is surrounded by the Ross Ice Shelf, which is a block of ice roughly the size of France and is floating on the Ross Sea. This is important to the

It's All About the Ice cont'd on page 48. 



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Do Drill Cuttings and Water Make a Good Drilling Fluid?

by John Christ
J.C.'s Drilling Consultant

To be blunt, NO! The formation is always changing, so your fluid will be also. What kind of cuttings do you make in sand, gravel, and rock? A lot of fine grains with porosity. Which means you will have water loss to the formation, leading to poor borehole stability. Really, the biggest reason is you can't control or predict the properties of this kind of fluid. With a high-quality drilling fluid, you can do API (American Petroleum Institute) testing of your fluids. This will tell you the effectiveness of your fluid. It will also be another indicator of what's going on down hole.

Drilling fluids help you to stay out of trouble. One thing I can tell you, trouble always costs time and money! You can have the best drilling fluid, but if your drilling techniques are poor, then maybe water and drill cuttings are best. If anything, you will have an excuse for why things went bad! The very first drilling fluid as I have been told was having cows run through a patch of water to stir up the mud, then this mixture was poured down the hole. Well, there have been many advancements from then.

Keep in mind, we are only talking about industrial applications in my articles, so oil-based muds won't be discussed. There are three basic types of drilling fluids: water-based bentonite, polymer, and air. Air? Yes, air! If used properly it can accomplish some objectives of a drilling fluid, so therefore it's a drilling fluid. Now this isn't rocket science. You have the knowledge of your territory or can access logs of wells drilled nearby. Maybe a test hole was drilled? This kind of information makes it easier to come up with a drilling fluid plan. Sometimes things aren't as expected and your drilling fluid may need to be tweaked.

Okay, what should drilling fluid do? Different applications will require different results. Basically, a drilling fluid needs to get the cuttings off the bit and out of the hole to the surface; provide borehole stability to keep it from caving in; control the subsurface pressures during the drilling process; cool and lubricate the bit and drill string; prevent excessive fluid loss to the formation in permeable zones; transmit pertinent information of the formation being drilled to the surface; and finally, to provide protection to the zone providing production. Of course, several variables will dictate the properties your drilling fluid will require.

There is no universal drilling fluid, even though bentonite is thought to be the answer to just about everything. There are additives to address the different formation issues. Again, drilling fluids are only a part of the equation, poor drilling habits such as swabbing the hole rapidly with the pumping equipment turned on can lead to cave-in and hole instability. Drilling fluids, just like every-

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Christ cont'd on page 52.

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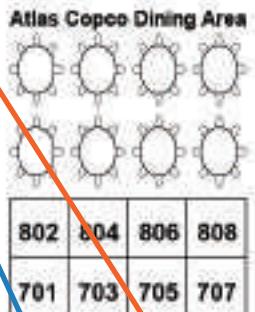


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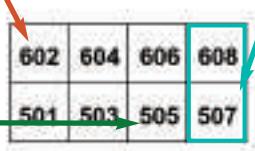
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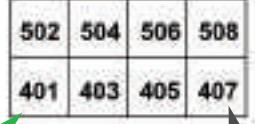
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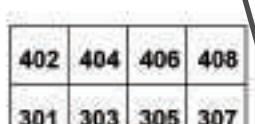


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www.facebook.com/WorldWideDrillingResource

President/CEO/Managing Publisher: Veronica I. "Ronnie" Jones
ronnie@worldwidldrillingresource.com



Vice President: Troy S. Cunningham
troy@worldwidldrillingresource.com



Representative: Marie Cunningham
marie@worldwidldrillingresource.com

Public Relations Professional: Brenda Helms
brenda@worldwidldrillingresource.com



Office Administrator: Michele Stevens
michele@worldwidldrillingresource.com



Public Relations Professional: Kathy Heinrich
kathy@worldwidldrillingresource.com



Editor: Bonnie Love
bonnie@worldwidldrillingresource.com



Public Relations Professional: Betsy Willett
betsy@worldwidldrillingresource.com



Associate Editor: Caleb Whitaker
caleb@worldwidldrillingresource.com



Public Relations Professional: Jan K. Allen
jan@worldwidldrillingresource.com



Production/Webmaster: Marcel Schimpf
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Drilling Into Money Not Boring

by Mark E. Battersby

The ACA After the Failed AHCA

The attempt to repeal and replace the Affordable Care Act (ACA) "Obamacare" with the American Health Care Act (AHCA) failed. Since everyone must have basic health insurance which meets the government's standards, and larger drilling operations and businesses are required to provide their workers with the coverage, it means, fortunately or unfortunately, the ACA remains, warts and all, the law of the land for the foreseeable future.

The ACA continues to offer drilling professionals and their businesses a number of options. Coping with the basic requirement that every individual have health insurance, is the "Individual Mandate".

Today, the ACA's Individual Mandate requires previously uninsured independent contractors and business owners to purchase insurance or face annual penalties. The penalty for individuals who fail to obtain health insurance is equal to the larger of 2.5% of household income or \$695 per adult (\$347 per child under 18), up to a \$2085 maximum.

Much of the ACA's negative impact stemmed from the so-called "Employer Mandate" requiring businesses with over 50 full-time equivalent (FTE) employees to provide health coverage to full-time workers. The penalty equals \$2260 divided by 12 for each month an employer fails to provide coverage, multiplied by the number of eligible employees (minus the first 30 employees). In simple terms, FTE equals the total number of full-time employees plus the combined number of part-time employee hours divided by 30. Seasonal employees, contractors, and business owners generally don't count toward the total.

The ACA continues to offer small businesses affordable insurance options, cost assistance, and increased buying power via the Small Business Health Options Program (SHOP). Small businesses employing fewer than 50, can use SHOP to get better deals on employee insurance, but aren't required to do so. The plans offered on the state exchanges are classified in four primary tiers: Bronze, Silver, Gold, and Platinum, with higher premiums and better coverage as the levels ascend. The ACA offers a tax credit for so-called "lower wage" small businesses which purchase insurance coverage through SHOP. Small businesses which provide health-care coverage can see up to a 50% reduction in their share of the cost.

With talk of further attempts to repeal and/or replace the Affordable Care Act, keeping abreast of its many benefits and potential pitfalls is more important today than ever. It is, however, the skyrocketing cost of health care which makes professional guidance a necessity for every drilling business - and its owners.

Mark

Mark E. Battersby may be contacted
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Kerosene's Connection to the U.S. Space Program

Adapted from Information by the American Oil & Gas Historical Society
and the National Aeronautics and Space Administration

Canadian physician and geologist Abraham Gesner began refining an illuminating fuel from coal in 1846. "I have invented and discovered a new and useful manufacture or composition of matter, being a new liquid hydrocarbon, which I denominate kerosene," he noted in his patent.

By 1850, he formed a company which focused on installing lighting in the streets in Halifax, Nova Scotia. This led to the establishment of the North American Kerosene Gas Light Company in Long Island, New York, in 1854.

Although Gesner had coined the term kerosene, from the Greek word keros (wax), since his fluid was extracted from coal, U.S. consumers called it coal oil as often as they called it kerosene.

It didn't take long for things to change. By the time of the first commercial U.S. oil well drilled by Edwin Drake in 1859, a Yale scientist (hired by the well's investors) claimed oil was a far better source for making kerosene. Soon, demand for kerosene refined from petroleum launched the country's exploration and production industry.



In 1926, Robert Goddard used gasoline to fuel the first liquid-fuel rocket, seen here in its launch stand.

Ultimately, electricity would replace kerosene lamps while gasoline dominated the demand for a transportation fuel. However, kerosene's ease of storage and stable properties gained the attention of rocket scientists.

After decades of rocket engine research and testing, the Rocketdyne F-1 engines were developed to provide 7.5 million pounds of thrust for the Saturn V rocket. During a launch, five Rocketdyne F-1 engines (of the massive Saturn V's first stage) would burn Rocket Grade Kerosene Propellant at 2230 gallons per second.

Saturn's rocket fuel is actually highly refined kerosene RP-1 (Rocket Propellant-1 or Refined Petroleum-1) which, while conforming to rigorous performance specifications, is basically the same coal oil invented by Gesner.

According to David Woods, author of *How Apollo Flew to the Moon*, the F-1 remains the most powerful single-combustion chamber, liquid-fueled rocket engine ever developed. The Rocketdyne F-1 engines, which are 19 feet tall with nozzles about 12 feet wide, are equipped with fuel pumps capable of delivering 15,471 gallons of RP-1 per minute to their thrust chambers.

When Apollo 11 landed on the moon in 1969, it was kerosene rocket fuel powering the historic voyage. This event crowned liquid-rocket fuel research in America dating back to Robert H. Goddard and his 1914 rocket apparatus powered by gasoline. In March 1926, Goddard launched the world's first liquid-fuel rocket, powered by liquid oxygen and gasoline, from his aunt's farm in Auburn, Massachusetts.

Even though propellants such as liquid hydrogen and liquid oxygen have since replaced gasoline, RP-1 kerosene continues to fuel spaceflight.

Cheaper, easily stored at room temperature, and far less of an explosive hazard,

kerosene continues to fuel first-stage boosters for the Atlas, Delta II, Antares, and latest SpaceX rockets.

Although the Saturn V was last launched in 1972, it remains the most powerful rocket ever built.



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Environmental Monitoring

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

Drilling Permits ~ Why Do We Need Them?

My first job out of college was working for a Water Management District (WMD), in the late 1970s. We had just begun permitting of all water wells. The reaction to water well permitting, with a fee, ranged from cooperation from drilling businesses to those refusing to get permits, and even some contractors drilling wells on weekends to avoid being caught.

Ironically, the well permitting idea itself was started by a small group of well drilling professionals in the 1950s, who were concerned "ungrouted" rotary drilled wells in our coastal areas were causing salt water to move upward from continued zones into potable water table aquifers. These drilling contractors realized if these wells were not grouted, they soon would cause widespread contamination, and they would eventually be putting themselves out of business.

Permitting was a way of helping ensure every well casing was properly grouted, from the top of the producing zone to land surface. The permit required the drilling contractor to call the WMD 24 hours prior to grouting, so an inspector could observe the method used. Drilling professionals by nature are a lovable but highly independent group of contractors who (most) do not want or need to be supervised. Besides being "made" to do something "new", the cost of grouting a well would add 20-40% more to the total cost of the well. Some were actually drilling wells without permits, on weekends, in remote areas, charging less money, and stealing business from the honest law-abiding ones. They even banded together to try to get the law taken off the books.

My job was also operating the borehole geophysical logging truck to map the geology of the 16-county area. We could actually require any well we wanted to be logged by making it a condition of the construction permit. Although I tried to get along with all the drilling businesses, some never were cooperative. It was rumored I could tell whether the well casing was grouted and where it was not. This was true to some degree (with a temperature log), but not very reliable.

I'm pleased to say, 40 years later, the Well Permitting Program is alive and "well" and the groundwater resources are also in pretty good shape considering groundwater use has more than quadrupled.

Tom

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



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tallize and contain high concentrations of minerals present only in trace amounts in granitic rocks.

Pelite - A rock composed of fine particles of clay or mud.

Pelitomorphic - Pertaining to clay-sized carbonate particles in limestone or dolomite. Also refers to limestone or dolomite consisting of an aggregate of pelitomorphic particles or having a matrix of such particles.



... I really enjoy your magazine.

Donald Oehring
Don Oehring Well Drilling
Woodhaven, MI

Frequently-Used Geological Terms Part 62

Glossary Adapted from the Dictionary of Geological Terms

P

Paleogeography - The study of the physical geography of all, or a part, of the earth's surface in the geological past.

Palingenesis - The formation of new magma by the melting of preexisting magmatic rock in situ.

Pallasite - A stony iron meteorite.

Panning - A technique of prospecting for heavy metals, such as gold, by washing placer or crushed vein material in a pan. The lighter fractions are washed away, leaving the heavy metals behind in the pan.

Paper Shale - A shale which splits into thin laminae, suggesting sheets of paper.

Paraffin-Base Crude - Crude oil which will yield large quantities of paraffin in the distillation process.

Parent Element - The radioactive element from which a daughter element is produced by radioactive decay. For example, radium is the parent element of radon, which is the daughter element.

Patina - A colored film or thin layer produced on the surface of a rock by weathering. Also refers to the greenish film formed on copper and bronze after exposure to a moist atmosphere consisting of a basic carbonate.

Pedion - A crystal form with only one face.

Pegmite - An exceptionally coarse-grained igneous rock with interlocking crystals usually found as irregular dikes, lenses, or veins. The composition of pegmatites is similar to granite; it may be simple or complex, and may include rare minerals rich in elements such as lithium, boron, fluorine, niobium, tantalum, uranium, and rare earths. Pegmatites represent the last and most hydrous portion of magma to crys-



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team because the ice shelf is the largest in Antarctica, and it holds back the flow of the ice sheet upstream. One of the primary interests of the researchers is to learn the history of the Ross Ice Shelf and the climate of the region over the last glacial-interglacial transition. Roosevelt Island is also located at the terminal end of the West Antarctic Ice Sheet, which once extended over the top of the site, but has retreated since the end of the last ice age. So, the team is hopeful new spatial information about the climate in West Antarctica will be found with an ice core from the site.

It took nearly three years for the team to build the camp, select the drill site, and install the drill. The goal is to drill an ice core to a depth of nearly 3000 feet. To do this, the drill must be hollow because the goal is to retrieve core samples and not to destructively drill through the ice sheet. As the drill head carves out the ice cores, the team must keep the borehole open by collecting the ice cuttings. The ice cuttings look like shaved ice because an ester-based drilling fluid must be used to lubricate the drilling process and fill the void caused by the coring.

Once the ice core is retrieved, it must be stored and shipped at a low temperature. The average yearly temperature for a low elevation site like Roosevelt Island is -9°F (-23°C). That's pretty cold. So, it shouldn't be very hard to keep the ice core at a low enough temperature, right? Well, actually it's quite a bit more complicated than one would think.

One of the primary aspects the team will look for during analysis of the ice is measuring the ancient samples of atmospheric gases like carbon dioxide and methane. The problem is these gases will start to diffuse when the cores get warmer than about -1°F (-18°C), and during the summer, the temperature can get close to 32°F (0°C). So, the team will keep the ice cores at an appropriate -9°F (-23°C) by storing them in a freezer located in a snow cave nine feet below the surface, which will have ducts plumbed into it to circulate air through the unit.

Finally, the ice core will be flown out of Antarctica on a plane with all the heat aboard turned off, while the plane flies higher than normal. This keeps the cores cold enough until they get to the landing destination, where they will be unloaded and stored in a mobile freezer on a big sled. The sled will tow the cores back to Scott Base where a final freezer awaits to ship them across the ocean to New Zealand. Once home in New Zealand, the team will analyze the core samples to see what the ancient ice will reveal.

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Adversity

by Tim Connor

Adversity either brings out the best in you - hidden deep in your soul - or it will take you down with a variety of debilitating emotions or responses. Whether it is a financial, emotional, business, health, or career challenge, it doesn't really matter, the consequences are the same: uncertainty, fear, panic, temporary loss of hope, an abandonment of goals or desires, and a loss of confidence, faith, and trust in yourself or those you are close to.

Adversity is necessary to build character, courage, strength, and the will to persevere. If you are to enjoy the successes and achievements life offers you and will cross your path, it is necessary to experience loss, pain, grief, or fear during these challenging times. If your entire life was filled with nothing but success after success, you would certainly become very arrogant and ego-dominated - neither of which are favorable life approaches. Adversity is necessary to soften your humanness so you can have compassion not only for yourself, but others.

To have a life without adversity is to live in fantasyland. Sooner or later, adversity strikes its victims (all of us) when they least expect or want it. Adversity can bring people to their knees or it can strengthen their resolve. It can turn an otherwise humble individual into a tiger, and it can cause the strongest souls to cringe in its wake. Why the difference?

Adversity is insensitive and neutral to its recipient's reactions or responses. It treats everyone the same. Each of us has the ability to reach down and grab the courage to overcome - sometimes with courage we were not even aware we possessed. We can choose to overcome, or we can choose to give in. The difference lies in a person's character, genes, history, commitment, will, and strength of desire. Adversity can be a patient teacher, or it can be a tyrant. Again, the choice is ours.

As I look back over a life filled with adversity in every area (not whining folks), I can tell you from personal experience I would not be who I am today had it not been for all of the challenges I have faced through the years. At the time, I resented each and every one of them. Today, in hindsight, they have given me the strength, courage, will, resolve, and patience to carry on in the face of overwhelming odds. I don't know how my life will end, but I know one thing - I would not trade any of the adversity I had to deal with for any amount of money, fame, or fortune.

How about you? How do you define adversity, and how do you typically respond to it? Learn from it? Deny it? Hide from it? Or face it???

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@worldwidldrillingresource.com

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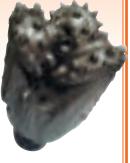
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rock construction, and grout casing in. So, what about cable tool drilling, can drilling fluids help this? They drill a little bit then pound a piece of pipe down. Nothing beats steel wall cake! If they are in a formation that's unconsolidated and wants to keep falling in, it could cause issues. Bentonite could help stabilize the area. What about clay balling up on the bit reducing the penetration rate? How about running a polymer that helps keep the clay from swelling and maybe a surfactant to take the stickiness out of it? With horizontal directional drilling, all the properties are different. Now we are trying to create a slurry which is displaceable to accept whatever we are trying to place under the surface - be it cable, conduit, monitoring system, utilities, or whatever. The reason for the use of the products are the same, but the purpose of the fluid is different.

Next month, we are going to explore some of the products available. Thanks for reading and go forth drilling profitably!

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 WWDR.

John

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

Trucking Company Expands into Explosives Industry

Adapted from Information by R & R Trucking

AATCO R & R NEI
Trucking, Inc.



The *WWDR* camera caught up with Kevin McKelvy and David Leidy at the recent International Society of Explosives Engineers Conference.

hires were up last year, and we are well positioned to add as many driver teams as necessary to handle increased capacity this year."

R & R Trucking, Inc. announced they are expanding their sales efforts in the commercial explosives and hazardous materials arenas for 2017.

R & R Trucking, Inc., with its group of carriers, AATCO and NEI, is North America's largest trucking company specializing in the transport of sensitive cargo.

To handle its projected sales growth, the company is adding equipment and team truck drivers. According to Kevin McKelvy, R & R vice president of administration, "Driver

thing else on-site, are just a tool. Every drilling fluid manufacturer has mud engineers willing and able to help you

learn more about their products, contact them! Even though there is a cost for drilling fluids, this will save you time and money at the end of the day. There is wear and tear on your tooling which can be reduced by running a quality drilling fluid system.

Let's take a moment and talk about the differences between water well drilling and horizontal directional drilling. For a water well, you need to clean the borehole to accept a casing and possibly a screen, add gravel pack if it's not an open hole can drilling fluids help this? They drill a little bit then pound a piece of pipe down. Nothing beats steel wall cake! If they are in a formation that's unconsolidated and wants to keep falling in, it could cause issues. Bentonite could help stabilize the area. What about clay balling up on the bit reducing the penetration rate? How about running a polymer that helps keep the clay from swelling and maybe a surfactant to take the stickiness out of it? With horizontal directional drilling, all the properties are different. Now we are trying to create a slurry which is displaceable to accept whatever we are trying to place under the surface - be it cable, conduit, monitoring system, utilities, or whatever. The reason for the use of the products are the same, but the purpose of the fluid is different.

Christ cont'd from page 38.

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Scientific Developments and Historical Significance Help to Reopen Mine

Compiled by the Editorial Staff of Worldwide Drilling Resource®

The historic Collyweston Mine in Northamptonshire, England, has restarted mining operations for the first time since it closed over five decades ago. For centuries, Collyweston slate was created by leaving lumps of the limestone outside overnight in the frost to split naturally along its veins, producing stones ready for shaping using specially designed hammers. Once worked, the stone slates were ready for use as local roofing or other building needs. However, the changing climate made leaving the limestone out overnight to frost an unreliable method, and mining had to cease in the 1960s. Developments in recent years by Natural England, the government's adviser for the natural environment in England, working alongside Sheffield Hallam University have shown industrial freezers can replicate the natural process for splitting the limestone by artificially freezing it, which then causes it to crack into slates.

The demand for Collyweston slate comes from its considerable local historical significance as a building material. Its distinctive color and hard wearing characteristics made it a common feature for buildings in Cambridge, including the Master's Lodge at Trinity College, and the Round Church, as well as homes and listed buildings across the country. However, today it's a scarce resource, causing some slates to be reclaimed from old buildings for reuse.

Due to the lack of slate supply, Historic England, a public body which looks after England's historic environment, voiced the importance of reopening Collyweston Mine and using its slate to replace the deteriorating roof of Bodley's Court at King's College, originally laid in 1893. For Bodley's Court to keep its building status, it will need nearly 1500 square feet of Collyweston slate for the reroofing scheduled to begin in 2018.

Collyweston Mine's newly opened seam accessible from a shaft at a building yard just outside the village of Collyweston began extraction in January. It is thought to contain a supply of approximately ten years worth of slate, of which the first two years will be used to repair Bodley's Court. Some unique characteristics of the mine are the many signs of extraction from mining efforts hundreds of years ago. It is hoped this new source of Collyweston limestone could prove to be a rich seam of business. Site owner Nigel Smith said, "to get this mine, and application to get this mine working again, approved, is just massive not only just for us, but for the whole Collyweston slating industry."



Collyweston mine will provide slate for the reroofing of Bodley's Court, courtesy of Peter Church.

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O..OKLAHOMA...WHERE THE WATER EXPERTS GATHER

Jan Allen, Public Relations Professional, WorldWide Drilling Resource®



It may have been a little windy, but the Oklahoma Ground Water Association put on a great conference and trade show in Norman, Oklahoma. Registration was brisk for the events, and everyone was very patient. Such a great turnout is very rewarding to the staff and assistants who work so hard to put the conference together.



Seminars were well attended. Topics were diverse and interesting. The keynote speaker, a native of Central Oklahoma, was greeted with warm enthusiasm. Each speaker was well-informed and knowledgeable on the information presented. Want information on a specific topic or issue next year? Be sure to let the association staff know!

The exhibitors were well received and the atmosphere was very upbeat. It was great to see so many of the younger generation in attendance. Everyone was treated to a great feast, especially in

the dessert arena! Of course all the calories had been removed!

The **WWDR** Team thanks the staff for a great time and looks forward to next year's show!

Photos are compliments of **WWDR**.



Geotechnical Study Begins on the Alto Tunnel

Compiled by the Editorial Staff of WorldWide Drilling Resource®

The Marin County Department of Public Works (DPW) in California, has started a geotechnical study of the 132-year-old Alto Tunnel. Originally opened in 1884, the tunnel utilized timber supports and functioned as a railway passage from Mill Valley to Corte Madera, but was closed in 1971 because of a series of internal collapses and subsequent engineered stabilizations. Engineering reports state the timber supports are now in an advanced state of decay. In an effort to slow further collapse, the north end was lined and plugged with low-strength concrete. The investigative project of the 2200-foot tunnel would be the first look inside its corridors in more than 35 years. This investigation follows a 2015 study, which assessed the tunnel's right-of-way. The purpose of the geotechnical study is to observe the structural condition of the previously uninspected areas and assess the feasibility of reconstructing the tunnel.

If reconstructed and reopened, the tunnel would operate as an alternate and more direct route between central Marin and southern Marin for bicycle and pedestrian use. The Mill Valley to Corte Madera Corridor Study cost estimates for the Alto Tunnel and path would range from \$40-50 million. However, these numbers were based on a \$21 million cost estimate with 2% escalation, a 35% cost contingency, a 20% accuracy allowance, and an additional \$15 million for "Non Construction Project Cost." The results of the geotechnical investigation are required to identify the true scope of improvements needed to reopen the tunnel, so a more accurate and up-to-date cost estimate can be produced.



*The north entrance,
courtesy of Marin County.*

"Being able to actually see inside the tunnel and assess the geotechnical issues is an important step," said Bob Goralka, DPW principal civil engineer. "Having a tangible understanding of what's going on inside will help guide future decisions."

Engineers will not actually physically enter the tunnel; instead, they will study the interior sections from two sites above the tunnel. The fieldwork will require DrillTech to drill five holes, each four inches in diameter, at the two sites. McMillen Jacobs Associates will lower laser scanning probes into the tunnel, which will create images of its interior. The boreholes will be lined with steel as they are drilled then sealed with a permanent cap to ensure safety and security. By using advanced mapping technology rather than cutting a portal and physically entering the tunnel, the project will avoid higher costs and impact. The laser scanning will also provide the least impactful consequences to the surrounding community and result in only minor traffic disturbances.

Time for a Little Fun!

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

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Let's be Accurate

by Bill Corey

In the April *WWDR* magazine, I had a regular reader take a few odds with me on the accuracy and total honesty of my article. I had mentioned jet pumps came into existence in the early 1930s. Part of his objection was windmills and hand pumps were around before then. This is true, but they are not centrifugal pumps, they are positive displacement pumps. Even as such, they still only have a maximum depth of 34 inches - not really, but more than a jet pump. Remember, we only have the weight of the atmosphere pushing up on the water to get it to us.

If you move the positive displacement pump below the water surface, it pushes the water up and you can therefore get water from a deeper depth. Engineers are the ones who figured all this out, and while I like to make fun of them, I wouldn't know what I would do without them. A friend of mine has a Ph.D. in this field and fancies himself a good trainer. I certainly would never say he is not, because he has a lot of knowledge - more than I do. Yet one time when he asked me to train some of his installers, he said this after I was finished: "I'll admit you are a better trainer than I am, but I'm still smarter than you!" And he is correct, but getting the information across is very important in helping installers understand why they do what it is they do.

I look at it this way: If I can help you understand in what is called "layman's terms", then I have accomplished what needs to be done. I am not always 100% accurate, but if you understand why you need to do something, then I have done my job.

Please keep the letters and comments coming because I need help to stay focused on what is important. Thank you all!

Bill

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

Tales from the Field

by Jeremy C. Wire
Geoconsultants, Inc.



The Invisible Drill Crew

It is obvious water and agriculture go together, and over the years we have worked on many agricultural projects. Particularly where some new or novel crop to an area comes along, investors buy in, and large tracts of land are planted where no agricultural enterprise has existed before. Many years ago, one such project involved cultivation of jojoba plants, the oil from their beans being useful for such applications as high-temperature lubricating oils. Jojoba plants were already adapted to desert conditions, and many acres of land were dedicated to their cultivation in the arid regions of southeastern California and adjacent Arizona.

The setting for one such project was in southwestern Arizona, and our task was to complete geophysical surveys for irrigation well location for jojoba cultivation on a large parcel which had not been previously farmed. A water well drilling rig was scheduled to arrive on the property, and our task was to locate sites for test holes, and try to provide locations for drilling as quickly as possible. Test drilling was expected to proceed rapidly so irrigation wells could be constructed and planting occur soon thereafter.

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Detailed description: This advertisement features the Robit Inc. logo at the top. Below it, two product lines are showcased: Bulroc Robit and DTA Robit. Both brands are described as having a "complete selection of drilling consumables". The central image displays a variety of drilling tools and consumables, including several green cylindrical containers labeled "DTA Robit", a red handheld device with a screen, and various metal components like drill bits and rods. The bottom of the ad provides contact information: address (757 W Diversey Pkwy, Chicago, IL 60614), phone number (tel. +1-708-667-7892), and website (www.robitchgroup.com).

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One very hot day at the site, our crew, using a rented white-colored vehicle for fieldwork, spied the newly arrived drill rig off in the distance at one of the first recommended locations. Wanting to see how the drilling was going, they went to visit the operation. Upon arriving, everything was quiet, no machinery was running, but all the required service vehicles were present. No drill crew was in sight . . . where could they have gone? One possibility was there might have been some sort of an emergency and everyone had left for the nearest town.

After standing around puzzling about this, there was a brief stirring under the shade of one of the service trucks. One by one the drill crew slowly appeared, looking somewhat embarrassed. Apparently, they went into hiding as the white unmarked vehicle approached because they thought it might belong to the state regulating authorities who were coming to shut the operation down! In the contractor's haste to move on-site from California, although they had applied for proper permits for drilling, these had not yet been received, but the drill crew started drilling anyway. Once our crew introduced themselves as to who they really were, the drill crew was relieved, and in good humor everyone returned to work.

Altogether, about ten test holes were drilled in the campaign, followed by several satisfactory irrigation wells. However, we understood about a year or two later, a huge wind/sandstorm arrived and destroyed many of the jojoba seedlings, lending support to the idea that the "fortunes of farming" are often largely dependent on weather, as well as water.

*Jeremy
michele@
worldwidedrillingresource.com*



Exploring for Minerals

Adapted from Information by Amur Minerals Corporation

Amur Minerals Corporation announced its plans for the 2017 field program. The company focuses on nickel-copper sulphide mineral exploration and resource development in the far east regions of Russia. Their current program will continue exploration drilling work and complete additional site investigations related to engineering work being considered in the development of Kun-Manie.

The field program includes resource drilling and increased efforts focused on acquiring additional information related to the development of the project. As the company gets ready

to make a production decision, they have purchased additional mobile equipment to facilitate all aspects of the program, which will help accomplish the set objectives.

Construction of an ice road was completed in February, allowing for ongoing resupply of the site. With the completion of the road, the company will be in position to drill a minimum of 49,000 feet of core holes, which will target Kubuk (KUB) and Ikenskoe / Sobolevsk (IKEN).

At KUB, nearly 33,000 feet of drilling is planned, including infill resource conversion, and step out drilling. At least seven metallurgical bulk sample collection holes will also be completed.

At IKEN, over 16,000 feet of resource expansion drilling and metallurgical sample step out drilling will be done, of which 6500-8000 feet of it is planned for completion on the Sobolevsky part of the deposit. The objective is to expand resources in the direction of the KUB deposit. Additional drilling will also be completed, which will generate a metallurgical sample.

The company also has a series of boreholes planned in the area, which will be used to determine the amount of water available to process the ore. Other boreholes will be completed to determine potential water inflow rates and dewatering requirements for an area planned to have open pits and underground operation work.

Robin Young, CEO of Amur Minerals commented, "As we advance the project, we have begun to shift from resource drilling to a more focused site engineering effort. We will continue our exploration drilling intended to convert as much as 50% of the presently defined *Inferred* resource to *Indicated* and evaluate the potential for resource expansion at and between Ikenskoe / Sobolevsky and Kubuk where a large untested [2 mile] long target exists. Planning [49,000 feet] of drilling for the season, we will be stocking the site to allow for [65,000 feet] in case the weather permits us to complete a longer drill season as experienced last year."

Editor's Note: In between our print issues, the **WWDR** 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.worldwidldrillingresource.com

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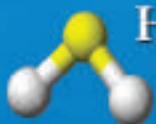


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Britt Storkson may be contacted via e-mail to michele@worldwidldrillingresource.com

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Storkson cont'd from page 18.

doesn't know what a wheel bearing is, and what to do if the temperature was too high.

Just because we can get the information, doesn't mean we should. In an article entitled "Big Data, Big Blunders" (*Wall Street Journal*, March 10, 2013) the writer states, "Companies are finding that big data doesn't necessarily translate into easy success." The writer cites five mistakes companies often make when it comes to information (data) management. I'll paraphrase the first three here:

1. Data for data's sake. We gather data because we can, not because we should.
2. What do we do with the data we have? If there is no clear application or advantage to the data gathered, why do we spend the time and money to compile it?
3. If the data isn't organized, we might as well not have it. There's no sense in having data if you cannot find it when you need it.

On a practical level, unnecessary data requires more memory to contain the data, more software to manage the data.



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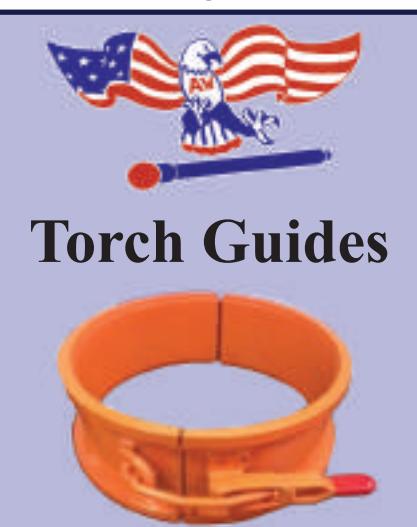
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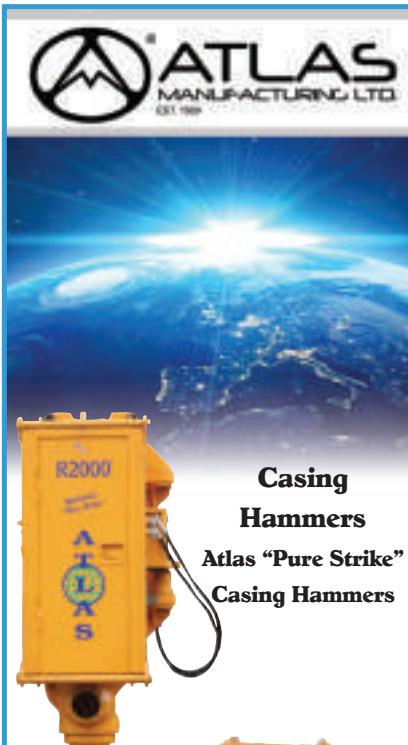
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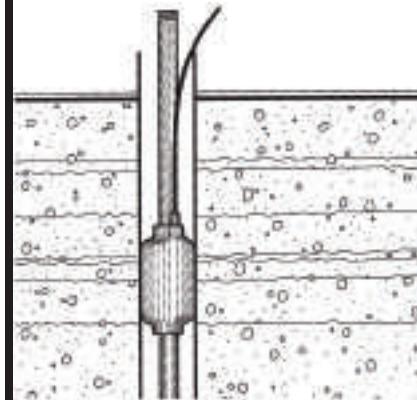
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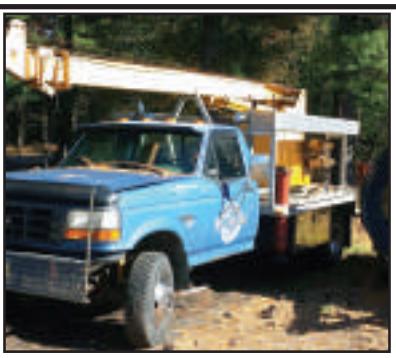
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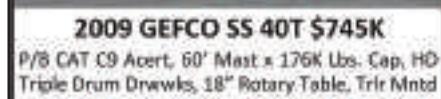
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