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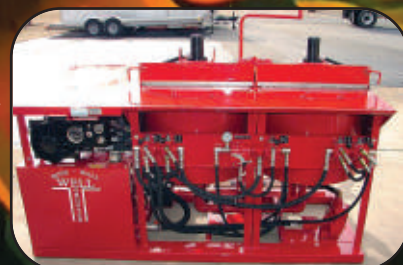


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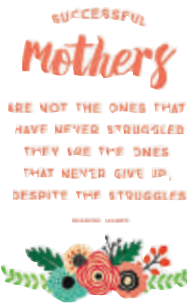
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With pen (computer) in hand . . .

Ronnie, Managing Publisher  
ronnie@worldwidedrillingresource.com

This month we have the privilege of celebrating Mother's Day and to take time to say  
Thank-You to our brave American Military.  
God Bless you and these United States of America.

One quick question - are you scheduled for this year's **GEFCO** Training at the plant in Enid, Oklahoma? There are many great training events throughout the year(s). Check with **WDR** for the up-to-date information. If you haven't made arrangements yet, you better mark that down for 2020! Time seems to get away from us!

Don't forget to go visit mom! Some of us can do that in person, but for some of us we say a special prayer for her in heaven. Enjoy her now - life is far too short.

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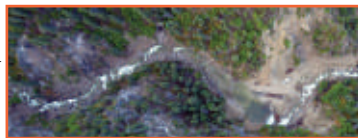


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## Featured Articles for May

**Proudly Made in the United States of America - delivered WorldWide!**

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# Deployment Nears for Full-Body, Powered Industrial Exoskeleton

Adapted from Information by Sarcos® Robotics

C&G

Sarcos® Robotics develops robotic solutions to augment human workers. The company has made a number of significant technological advancements for its highly anticipated Guardian XO Max full-body, powered industrial exoskeleton robotic system. The company has completed the assembly of the world's first all-electric, battery-powered, full-body industrial exoskeleton capable of enabling a human operator to safely lift and manipulate up to 200 pounds for extended work sessions, and they plan to start shipping the Guardian XO Max to customers in early 2020.

With 17 years of development efforts, Sarcos has been laser-focused on ensuring the Guardian XO Max is safe, intuitive, and power efficient. Initial testing has demonstrated an unprecedented reduction in power consumption, with the system requiring less than 400 watts of power while walking at human speed. This reduction is more than a 90% decrease in power typically required for humanoid robots while enabling work sessions of up to eight hours on a single charge.

Furthermore, the unit is designed to allow its battery modules to be "hot swapped" in the field within seconds without loss of power to the unit.

"There are many misperceptions regarding the commercial readiness and viability of full-body industrial exoskeletons that are capable of substantially increasing human strength and endurance, including the amount of power required to operate these machines," said Ben Wolff, chairman and CEO of Sarcos Robotics. "With our innovations in optimizing power utilization, Sarcos has been able to do what no other robotics company in the world has been able to do with powered exoskeletons or humanoid robots - power a human-scale robot doing meaningful work for up to eight hours on a single charge."

The Guardian XO Max will usher in a new era of intuitive user experiences through implementation of Sarcos' proprietary advanced control system, called "Get-Out-of-the-Way" control, which will simplify the operation and use of these suits. The control system is designed to eliminate any delay between movement of the human operator and the exoskeleton by relying on a suite of sensors integrated into the exoskeleton, foregoing the need for sensors to go directly onto the human body. The result is the capability of the Guardian XO Max to respond to the human operator's movements in milliseconds, allowing the operator to intuitively control the robot in a way which leverages his or her instincts and reflexes, and minimizes the need for human training.



The exoskeleton will also reduce load strain to improve worker safety. Occupational back injuries cost U.S. employers more than \$100 billion annually, underscoring the need to improve worker safety and provide a means to eliminate strain on the body. The Guardian XO Max has been designed to be full-body and fully-powered, meaning the entire weight of the suit, as well as its payload, is transferred through the suit's structure to the ground. This results in offloading 100% of the weight the worker is bearing, as well as the weight of the suit itself, which substantially reduces the operator's metabolic output and drastically reduces the risk for worker strain or injury.

John Santagate, research director at the International Data Corporation (IDC) said, "The potential for full-body, powered exoskeleton technology is immense - from giving our workers superhuman strength without putting added strain on their bodies, to improving productivity and efficiency. Sarcos' Guardian XO Max will be a game changer for the industrial workforce, improving strength and capabilities, reducing the risk of injury on the job, and increasing the quality of life and longevity of workers."

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by **Tim Rasmussen**

The truck donated by Wes Loomis of Loomis Truck and Tractor was finally ready. The frame and bed had been lengthened, rear axle moved back, the hoist was rebuilt and mounted, and a large generator was strapped to the bed along with some tanks and other items. All was ready. Now to get it to Guatemala.

We usually ship trucks from Florida or Texas, and we have driven them down across Mexico, but it is a long drive. Gary checked with our shipping agent and learned the port of Seattle would only handle containers, and this had to be shipped "breakbulk cargo." This is cargo or goods which must be loaded individually, and not in intermodal containers nor in bulk as with oil or grain. Gary began to contact people who might have some ideas on how to do it.

Finally, Gary was referred to an agent who had a connection to ship out of Tacoma, Washington, and eventually he was in contact with Bryan O'Dell of Wallenius Wilhelmsen Ocean. They are a Norwegian/Swedish shipping company specializing in shipping cars, trucks, and heavy equipment worldwide. They have large roll-on roll-off (RoRo in ship-speak) vessels.

As it turned out (as it often does when the Good Lord is the shipping agent), Mr. O'Dell had been to Guatemala many times and was very interested in what Water For Life (WFL) is doing there. He worked with his manager, the Pricing Team and Operations and was able to elevate the request so as to get WFL a free ride on one of their vessels. The only charge from them would be the charges of the "3rd party carrier" from Panama to Guatemala. The loading of the truck in Tacoma and shipping to their hub in Panama was 100% free of charge. What a blessing for Water For Life and our donated truck.



Gary's nephew Don drove the truck on the shakedown run from Spokane to Graham, Washington, which is near Tacoma. They took it to Jon Hansen who is a co-owner of Tacoma Pump and Drilling, and a WFL volunteer. The truck made it into their yard with no issues. This is a good truck!

Meanwhile, Gary and I worked on getting the paperwork together for the shipment. There was some issue with getting the title released and properly in the name of Water For Life. Wes Loomis took care of that. Gary had to sign a power of attorney for the shipping company. I made up a document on WFL letterhead to certify Gary was its

vice president. Everything had to be notarized and looking as official as possible. We have learned that the more notarizations and seals and ribbons attached to a document, the less trouble the Guatemalan officials seem to have with them. I guess if it looks right, it is right.

As of this writing, the truck will be loaded onto the Wallenius Wilhelmsen Ocean vessel *Oberon* and must be in-gated to the port on January 14. The *Oberon* will leave the port of Tacoma on January 18. I trust the truck will make the port, make the ship, get through customs, and into our hands so it can start its second life in the highland jungles of Guatemala, bringing life and health to the folks there.

Thank you for all the good folks who made this possible. If you would like to be part of something good, part of something that changes lives, part of something bigger than yourself, come and join us. If you can't come, donate so someone who can come, will.

If you would like to help,  
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*Tim*

Tim Rasmussen may be contacted  
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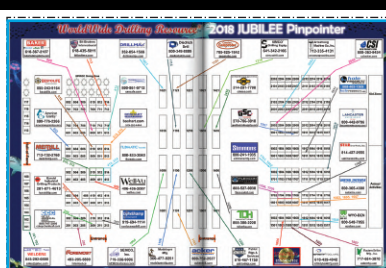
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## New Mineral Discovered in Israel

Adapted from Information by Shefa Yamim Exploration & Mining

EXB

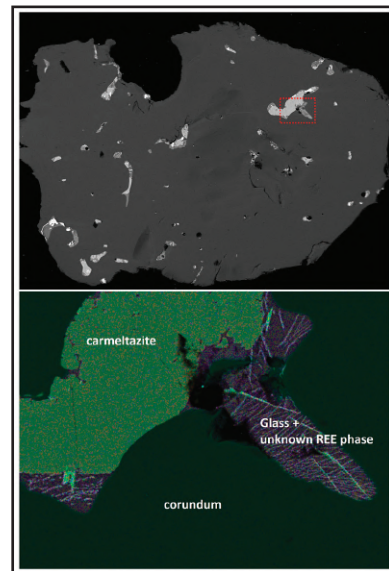
in primitive meteorites. They occur in fragmental lavas which erupted from small volcanoes on Mt. Carmel in the late Cretaceous period.

The newly recognized mineral within this special sapphire has been named Carmeltazite. When it was first discovered by the company, it was given its name based on the location of its discovery on Mt. Carmel (Carmel) and its major chemical components, titanium, aluminum, and zirconium (Taz). It is part of the mineral assemblage found as tiny inclusions inside the Carmel sapphire.

The International Mineralogical Association (IMA) Commission on New Minerals, Nomenclature and Classification officially recognized carmeltazite under the number 2018-103.

Avi Taub, CEO of Shefa Yamim said, "We are delighted that our Carmel Sapphire™ has been recognized as a host to many rare minerals . . . The Carmel Sapphire™ is a unique discovery because it has not been found anywhere else in the world . . . Studies of [the] Carmel Sapphire™ and its new minerals mark another milestone in the Company's journey as we continue our progress towards trial mining . . ."

In addition to Carmel sapphires, the company's drilling and sampling of the prospect area in Northern Israel has led to the discovery of blue sapphires, rubies, hibonites, and large natural moissanite crystals, as well as diamonds.



**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.worldwidedrillingresource.com](http://www.worldwidedrillingresource.com)



# BREAKING NEWS

## Trump Signs Presidential Permit for Keystone XL

Recently, President Donald Trump issued a new Presidential Permit for Keystone XL pipeline project, bringing more than ten years of environmental review to a close.



"President Trump has been clear that he wants to create jobs and advance U.S. energy security, and the Keystone XL pipeline does both of those things," said Russ Girling, TransCanada's president and chief executive officer. "We thank President Trump for his leadership and steadfast support to enable the advancement of this critical energy infrastructure project for North America . . . The Keystone XL pipeline has been studied more than any other pipeline in history and the environmental reviews are clear - the project can be built and operated in an environmentally sustainable and responsible way," he added.

The Keystone XL is expected to create thousands of jobs while delivering economic benefits across North America. It will also be one of the safest, most efficient, and environmentally sound way to move crude oil to the U.S. Gulf Coast.

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## WHO'S IN THE NEWS

Additional announcements from the Michigan Ground Water Association, Central Mine Equipment, Drillers Service, Inc., and Mitsubishi Materials USA are located in our online issue at: [worldwidedrillingresource.com](http://worldwidedrillingresource.com)

The Michigan Ground Water Association (MGWA) presented Katz Well Drilling with its Distinguished Business Award.

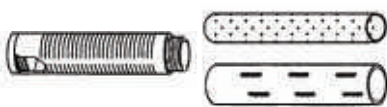


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used in explosive atmospheres). IECEx has determined fiber-optic connectors, receptacles which couple fiber-optic cable to an enclosure, are potential ignition sources in explosive atmospheres under certain conditions, or "Zones," as determined by ATEX.

"The primary ATEX zones where fiber-optic connectors should be certified as safe are Zone 1 and Zone 2. Zone 1 is defined as a place in which an explosive atmosphere is likely to occur in normal operation," said Phillip Hoyle, an expert in fiber optics and product development specialist with Optical Cable Corporation (OCC). "Zone 2 applies to locations where an explosion is not likely to occur in normal operation, but if it does occur, will persist for a short period only."

OCC recently developed the EZ-Mate Ex line of connectors, which provides up to 24 fiber connections in a single connector and has hazardous location protection for Zones 1 and 2. Hoyle explained, "Having certified fiber connectors installed in a hazardous area not only speeds up the certification process, but can also reduce time to market along with reduced testing and certification costs for the customer."

To make the explosive atmosphere fiber solution a comprehensive one, manufacturers like OCC work with ATEX / IECEx-certified enclosures manufacturers to provide a complete end-to-end solution. These comprehensive solutions will ensure safer environments for workers and equipment, as well as make the conversion to directive-compliant explosive atmosphere protection more efficient, with minimal downtime.

## Connector Solutions for Fiber-Optic Cables in Explosive Atmospheres

*Adapted from Information by Rankin PR*

DIR

In the gas and oil industry, fiber is increasingly being used in upstream exploration and production, downstream at the pump, as well as everywhere in between. In land-based oil rigs, high-speed fiber-optic cable is required to control automation, monitor equipment status, and communicate predictive notifications when components are in danger of failing. These capabilities create enormous cost savings by avoiding extended downtime due to catastrophic equipment failures.

The use of fiber-optic cable is also increasing in a wide variety of hazardous locations, including sites with potentially explosive atmospheres which put workers and equipment at risk. According to organizations which establish international safety requirements, the potential for fiber-optic connectors to cause ignition of explosive atmospheres presents a real hazard. Explosive atmospheres exist in areas where flammable gasses, vapors, mists, or dust are mixed with the surrounding air, creating the risk of an explosion throughout the entire area. Oil platforms, gas pipelines, distribution centers, oil refineries, and chemical processing plants are some locations which could meet these conditions.

Because the hazards of explosive atmospheres are a global concern, special standards have been issued to establish minimum requirements for improving the health and safety of workers potentially at risk from explosive atmospheres. The two bodies which certify these standards for fiber are ATEX (Atmosphere Explosibles - the name given to directives used for controlling explosive atmospheres in the European Union), and IECEx (International Electrotechnical Commission's system of standards relating to equipment



*EZ-Mate Ex line of connectors, courtesy of Optical Cable Corporation.*

### Open the Doorway to all the Event Photos during **Michigan Ground Water Association 2019.**



To see all the photos from this event, go to

**[worldwidedrillingresource.com](http://worldwidedrillingresource.com)** or click [here](#).

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# In Memoriam

## *James Meyers (1968~2019)*

Sadly, James Meyers, 50, of Oconto Falls, Wisconsin, passed away February 17, 2019, as the result of a snowmobile accident. Since 2003, he was the third generation owner/operator of Luisier Drilling.

He will be remembered for his zest for life while boating, snowmobiling, golfing, riding his Harley, and following all Wisconsin sports teams - especially the Packers as a season ticket holder. He enjoyed his six-day-a-week Bod-e Bootcamp fitness center workout to stay in shape. A longtime member of River Island Golf Club, he sponsored his own league team and volunteered equipment and his time to improve the course.

Left behind to cherish James' memory is his wife Stephanie; their children Gregory (Stacey) and Morgan; granddaughters Stella and Macy; his parents; siblings; extended family; and friends.



## *Lloyd Vernon Huckfeldt (1941~2019)*



Lloyd Vernon Huckfeldt, 77, passed away in his Napa, California, home on February 26, 2019, after a six-month battle with bladder cancer. Born in Nebraska, he joined the Navy after high school graduation and travelled the world on a destroyer as a sonar technician. After landing in San Diego and fulfilling his four-year term, Lloyd travelled north to Napa, where he met his first wife Elaine. His second marriage was to Marilyn.

He employed at Red Star, EZ Tire Repair, then started and ran Malco, a distributorship for auto shop/tire repair supplies. In the early 1970s, Lloyd purchased a piece of property which needed a water well, so he bought a cable tool rig and drilled one himself. His fascination with groundwater development encouraged him to become licensed, then he purchased a rotary drill rig and established Huckfeldt Well Drilling. He continued to improve his knowledge and upgraded the equipment, working with his son Don and a great crew, eventually selling the business to Don and his daughter-in-law Ann in 2005. He was a member of the National Ground Water Association, California Groundwater Association, American Legion, and Veterans of Foreign War.

Travelling in his RV, flying, and tinkering on projects were what Lloyd like to do. He enjoyed family gatherings and watching his granddaughters' sporting events. He was also an avid fan of the San Francisco sports teams.

Lloyd is survived by his son Don and daughter-in-law Ann; granddaughters Lexi and Halle; brother Dick (Liane); and nieces Tracie and Tana.

## *Charles L. "Charlie" Gallagher (1932~2019)*

Charles L. "Charlie" Gallagher, 86, passed away suddenly on February 27, 2019, at his home in Marshall, Michigan. He owned and operated a dairy farm for many years. He also worked for Ray Leonard Well Drilling for several years, and a short time at Eaton Corporation. A member of Saint Ann Catholic Church and the Kalamazoo Valley Antique Engine and Machinery Club, Charlie enjoyed his antique tractors and steam engines. He was always working with wood - making walking sticks, clothespins, and wood puzzles for family and friends. He was a familiar sight each year at the Calhoun County Fair. He loved going to family reunions, visiting friends, and showing people how to make rope using his rope maker.

Charlie is survived by his nieces and nephews Richard (Kristy), Marjorie (Mike), Carolyn (John), Bonnie (Ron), Russell (Beni), and Melissa (Bob); great nieces and nephews; and great-great nieces and nephews.



## *Lawrence Ross "Bud" Webber (1940~2019)*



The Utah Ground Water Association (UGWA) sadly reported Lawrence Ross "Bud" Webber, 78, of Salt Lake City, Utah, and Overton, Nevada, left this world on March 26, 2019, after a courageous battle with cancer.

Born in Salt Lake City, Bud attended West High School. He married Linda Lee, and they had four children. They later divorced. In 1985, Bud married his childhood sweetheart, Carol, and gained five more children. He and Carol then adopted a daughter.

Bud began his career in drilling in 1968, as a partner with J.G. Lee Drilling. In 1973, he started his own company, Webber Drilling. He was a member and past president of the UGWA.

He instilled in his children a strong work ethic, integrity, the love of family and animals, and most importantly to always "be your word".

Bud leaves behind his wife Carol; daughters RoquesAnn (Craig), Ronda (Tom), and Samm; stepchildren Tamara, Laurie, Kimberly, and Shane (Sonya), plus numerous grandchildren and great-grandchildren.

The management and staff of **WWDR** extend their sympathies to these drilling professionals' family, friends, and coworkers.

Lest we forget...



# Using Drones for Geothermal Energy Surveys

*Adapted from Information by Global UAV Technologies Ltd.*

GEO



Global UAV Technologies Ltd. is a drone technology company based in Vancouver, British Columbia (BC), Canada. Using both geophysical and thermal imaging sensors, the company recently completed a first-of-its-kind, drone-based geothermal energy exploration survey for Borealis GeoPower Inc.

Global UAV, a wholly-owned subsidiary of Pioneer Aerial Surveys Ltd., worked with Hummingbird Drones Inc. to collect and analyze high-resolution magnetometer and thermal data over the survey area in northern BC. Drones, also known as unmanned aerial vehicles (UAVs), conducted the survey using day and night flight operations for improved efficiency and data quality. The combination of UAV-MAG™ and drone-based thermal imagery produced high-resolution data of the geological and geothermal features of the survey area.

"Global UAV is continually bringing new drone technology to our customers while our drone solutions continue to see increased market share and new customer growth worldwide. Multiple divisions of Global UAV supported the successful UAV-MAG™ and thermal survey project, including our regulatory division for airspace management and permissions and our services division company, Pioneer Aerial," stated Michael Burns, CEO, Global UAV Technologies Ltd.

Borealis GeoPower CEO Alison Thompson was excited about the progress. "As a Canadian geothermal energy 'pioneer' ourselves, it seems fitting for Borealis to work with Global UAV's Pioneer Aerial Surveys on this groundbreaking application. The collaborative spirit brought by Pioneer Aerial was instrumental in successfully carrying out the work at the Terrace, BC, geothermal project. Near the location of one of the world's largest hot springs, Borealis is currently refining its reservoir model in advance of drilling in 2019. Geothermal power and heat are renewable energies well positioned to support the local and national economy, as well as the environment," she stated.



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## The "Idiots" Corner

by "Billy Bob Smith"

### Predictions

During my life, I have heard hundreds of predictions from politicians, the media, the clergy, teachers, friends, and relatives. I have to admit, with my limited knowledge and experience, some of them at the time made sense while others seemed to come out of no where and were amazingly stupid. Over the years, I have learned to ask these idiots, regardless of their position or status in

life, when they say something is going to happen or not happen in the future: "How do you know that?" And do you know what answer I get every time? Just more stupid opinions that are not grounded in any evidence or facts. They just need to be right, be smarter than me - whatever - they wanted me to think I was out of touch. Well you know what? I have finally figured it out - there are more idiots in the world today than people who want facts, truth, or evidence - just my opinion, folks.

Let me give you a few examples from the past and present. It doesn't matter who made them, so I won't mention any names, although they were all made by well-known and often respected individuals. My point is to ask you how many people do you think believed them and acted according to them at the time? Do you think society is getting more stupid or less? Not sure? Just turn on any channel on your TV for a few hours or eavesdrop on any conversation at the local coffee shop and I'll guarantee sooner or later you will hear some dumb prediction by someone who, in reality, has no clue or evidence, and certainly has no right or ability to predict the future.

"The world is going to end in 12 years because of climate change." (Many liberals.)

"The Beatles have no future in entertainment."

"Remote shopping will never happen."

"We can close the books on infectious diseases."

"The green new deal is the answer to our country's future."

"Democracy will be dead by 1950."

"A rocket will never be able to leave the earth's atmosphere."

Had enough? Okay - one more. "Literally, if we took away the minimum wage - if conceivably it was gone - we could potentially virtually wipe out unemployment completely because we would be able to offer jobs at whatever level."

*Billy Bob*

Contact him via e-mail to [michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)

"Everything that can be invented, has been invented." ~ Charles H. Duell, Commissioner, U.S. Office of Patents, 1899

"I have traveled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last out the year." ~ Editor in charge of business books for Prentice Hall, 1957

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## Unlocking the Subsurface with Robots

*Adapted from Information by the Commonwealth Scientific and Industrial Research Organization*

The U.S. Defense Advanced Research Projects Agency (DARPA) Subterranean (SubT) Challenge explores new approaches to rapidly map, navigate, and search underground environments. The Commonwealth Scientific and Industrial Research Organization's (CSIRO's) Data61 Robotics and Autonomous Systems Group is the only Australian entity competing in the SubT Challenge, and one of seven teams to receive up to \$4.5 million in funding from DARPA across the three-year challenge. The Data61 team is made up of nearly 30 people from CSIRO's Data61 research group, students from Queensland University of Technology and the University of Queensland, as well as two funded partners.

I really like this magazine as it always gives a lot with regard to drilling.

*Michael Rahe*

Ministry of Mines, Energy Water  
and Rural Electrification  
Solomon Islands



The team will create 3-D maps of underground environments through LiDAR (Light Detection and Ranging) scanners mounted on legged robots, as well as unmanned aerial vehicles capable of flying in global positioning system (GPS)-denied environments without a human controller. In 2017, Hovermap technology enabled the world's first fully autonomous beyond line-of-sight drone flight in an underground mine, nearly 2000 feet below the surface in Western Australia.

"We're honored to be competing in DARPA's SubT Challenge, drawing on decades of experience in developing robots, sensing, and communications systems for challenging environments like underground mines and caves," said Fred Pauling, Robotics and Autonomous Systems' group leader at CSIRO's Data61.

Once developed, the robotics and network technology can help human first responders in understanding and exploring hazardous underground environments, providing unprecedented situational awareness in time-critical

scenarios such as disaster response. It also has applications across a range of industries including mining, transport, construction, and agriculture.



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## The Use of 3-D Printing in Engineering

by Ian Hargraves,  
Assistant Design Engineer,  
Flomatic® Corporation

It's been five years since I finished college and began working in the valve industry. In those five years, the most beneficial technology to me has been 3-D printing.

I've always been a hands-on person, so being able to print an object and hold it in my hands was huge. At Flomatic® Corporation, we use FDM (fused deposition modeling) printers the most, as they can quickly produce accurate parts. FDM printers take a large spool of material, usually plastic (I've heard



Ian with the MakerBot Replicator,  
the company's FDM printer.

there's one that uses chocolate now) and heat it to its melting point. Once the material is hot enough, it's extruded onto a flatbed as a small layer. Once a layer is complete, the bed will drop vertically and print over the last layer. This process of adding layers might go on for another 50-1000 layers depending on the size of the part. We currently use FDM to print custom fixtures for assembly or testing. With 3-D printing, you're not limited to machining limitations and you can print individual and custom parts for everything, no minimum run is required.

The other type of printer we have in-house is a SLA (stereolithography) printer. The process of building layers is similar, but instead of extruding material, this process cures an ultraviolet (UV) resin. It begins with a pool of UV-sensitive resin which is hit with a laser to harden a layer. Once the layer is hardened, the bed will move vertically and the next layer will be lasered to the last. Once complete, the part will need to cure once more in UV light to finalize the part. SLA usually takes longer, but you can gain incredibly accurate and strong parts with this method. The parts we print using this method are used for testing new ideas or design changes. An additional benefit about SLA is with a little post sanding and polishing, you are able to get transparent parts which we use to show off our internals or see how the flow is.

Right now, 3-D printing is still largely about prototyping and fixtures, but with technology such as direct metal laser sintering (metal 3-D printing) becoming more available, we'll probably see it transition to production - hopefully within a decade.

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ENV

## Environmental Monitoring

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

### Removing Sediment from Well Water

Have you gotten calls about well water that occasionally has a small amount of sand, silt, or sediment? If the problem is getting worse over time, the well (or tank) may be filling up with sediment due to the pump pulling water from the well or tank every time the pump cycles on.

If you are able to measure the current depth of the well, compare that depth to the original drilled depth, and the well has become "shallower" over time, the well may no longer be fully developed and additional development or rehabilitation may be required. This development would normally be performed by a licensed water well contractor. In some states, a permit may also be required - check with the local permitting authority.

To remove those sediments, the well must be redeveloped using a large pump, bailer, and/or surge block. A compressed airline ( $\frac{1}{2}$ - to  $\frac{3}{4}$ -inch) should be lowered to the bottom of the well and pulses of high pressure be released down the pipe in two- to five-minute intervals to "blow" the water and sediment from the bottom of the well. During the process, watch to see if the well is gradually increasing in depth and the water is beginning to become clearer and void of sediment. I recommend catching the water expelled in a clear glass or clean white bucket. Continue the procedure until the depth becomes stable and the water clarity remains clear.

If the expelled water does not become clear, there may be a hole in the casing or screen. It could be that a clay layer exists near the screen, or producing section of the well. Lowering the pumping rate or installing a filter may also be an option. It may also be helpful to overpump the well occasionally (run the pump wide open and discharge near the wellhead to lower the pipe friction and increase the pumping velocity in the well) to clear the well.

Another possible solution is to install a large pressure tank near the well to allow the sediment to settle in the bottom of the tank which will require periodic draining and cleaning to remove the accumulating sediment.



*Tom*

Tom Kwader may be contacted via e-mail to [michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)



## Increased LNG Production Leads to New Export Facility

*Adapted from Information by Golden Pass Products  
and the U.S. Energy Information Administration*

The Golden Pass LNG (liquefied natural gas) facility in Sabine Pass, Texas, is one of the largest LNG facilities in the world, and it's about to get even bigger. Golden Pass Products, a partnership of Qatar Petroleum and ExxonMobil affiliates, is expanding its terminal with the export project. The current facility is only set up to import LNG; this venture will allow the facility to import and export natural gas.

Advances in directional drilling and hydraulic fracturing have led to an abundance of LNG for the U.S. In fact, the country began exporting LNG in February 2016, and according to the U.S. Energy Information Administration, export capacity is expected to more than double by the end of this year.

This endeavor, an investment of over \$10 billion, will include three liquefaction trains, three miles of new 24-inch pipeline to accommodate bidirectional flow capability, and additional compressor stations built on existing infrastructure. The project will also include upgrades to utility systems, interconnections to the existing facility, and expansion of the facility's storm protection levee system.

Construction has begun and is expected to take about five years. The engineering, procurement, and construction contracts for the project have been awarded to Chiyoda International Corporation, McDermott International Inc., and Zachry Group. "Our team has worked diligently on the design, development, and permitting for this world-class LNG export facility, and we are eager to begin construction to bring this exciting project to life," Sean Ryan, president of Golden Pass Products said.

Texas Governor Gregg Abbott, is excited for the investment. "Texas is proud that Golden Pass has chosen to expand its operations in Sabine Pass. This expansion represents not only an investment in creating jobs and growing our state's economy, but also in expanding our nation's international export reach and energy independence. I look forward to building upon our strong relationship with Golden Pass to keep Texas an energy leader at home and abroad," he stated.

Throughout the construction phase, it will support roughly 9000 construction jobs. Once operational, the facility should be able to export around 16 million tons of LNG per year and provide more than 200 permanent jobs.



Darren Woods, chairman and CEO of ExxonMobil; H.E. Saad Sherida Al-Kaabi, Minister of State for Energy Affairs, president and CEO of Qatar Petroleum; and U.S. Department of Energy Secretary Rick Perry stand behind Golden Pass President Sean C. Ryan and Enable Midstream Partners CEO Rod Sailor as they sign a transportation agreement for the Golden Pass LNG Export project.

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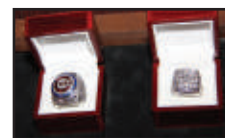
## Thoughts of My First Quarter 2019 Water Well Events

by Jan Allen, Public Relations Professional, *WorldWide Drilling Resource*®



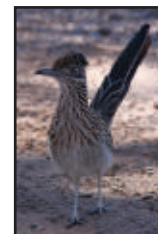
The first few months of each year are packed with conferences, conventions, annual meetings, and expos. This *WWR* Team Member travelled to various parts of the U.S. covering some of those events.

First on the schedule was the Oklahoma Ground Water Association Conference and Trade Show in Norman. Everyone was ready for the instructional seminars, as well as the opportunity to visit with exhibitors. This year, Associated Industries had a great exhibit of a mechanical calf-roping machine anyone could try out. A silent auction is held every year, and the items are exceptional, like this 2016 Cubs World Series Bryant ring and 1995 Cowboys Super Bowl ring. The Meet & Greet after the trade show was a great success, with the raffle drawings closing the evening.



Skeet Shoot photo by Dave Worwood.

Next in my travels was the Utah Ground Water Association Conference & Expo at the CasaBlanca Resort & Casino in Mesquite, Nevada. Great place for a vacation. The golf course is excellent, but watch out for the wildlife. While I was taking photos a year or two back, a road-runner decided he wanted to get in on the action. Sometimes the rabbits like to join in too. If golf isn't your thing, the association also has a Skeet Shoot that draws quite a crowd. Now, to the reason everyone is here. The training sessions were well-attended and folks on the trade show floor were able to answer questions. Everyone enjoyed the banquet and the auction. Raffle drawings



closed the evening and event.

There's nothing like a trip to Texas with *WWR* Team Member Ronnie. We ventured to San Marcos for the Texas Ground Water Association Annual Convention & Trade Show. It was a great time meeting up with old friends. The seminars were packed and attendees were eager to see the exhibits. There were plenty of giveaways, as well as raffles. Auction items were plentiful and raised money for the scholarship fund. All in all, it was a great event!



I'll round out the month of January with a trip into the cold, cold north for the Minnesota Water Well Association Annual Convention & Trade Show in Brooklyn Park. In spite of the cold weather (-9°F/-23°C), attendance was good. The seminars were crowded and the product displays had lots of visitors. The banquet was a great success with awards



being handed out, auction items sold, and raffle items drawn. Last, but not least, was casino night. Everyone enjoyed their evening.

The month of February found Ronnie and me back in the cold north for the Michigan Ground Water Association Annual Conference / Fundamentals. This event was more about training and regulations than products, but there were several exhibitors to talk about new techniques or equipment. The event ended with a banquet where awards were given and the auction of the "Screen Lamp" was handled. This lamp stays with the winning bidder for one year, then is returned the next year to be reaucted. All proceeds go to the scholarship fund. This year, the lamp auction raised the most it has ever reached.



Next, the *WWR* Team of Ronnie and I travelled to the Great Smoky Mountains for the Tennessee Water Well Association Annual Meeting & Trade Show. It was a great time for family and friends to meet and enjoy the sights and sounds of the surrounding area. Seminars were well-attended and exhibitors were asked many questions on products. The banquet was followed by a



scholarship auction. Lots of items went up for bid, from a crossbow for hunting to Easter baskets for the young, or young-at-heart. What thrills the soul is the next generation of drilling professionals who were present.



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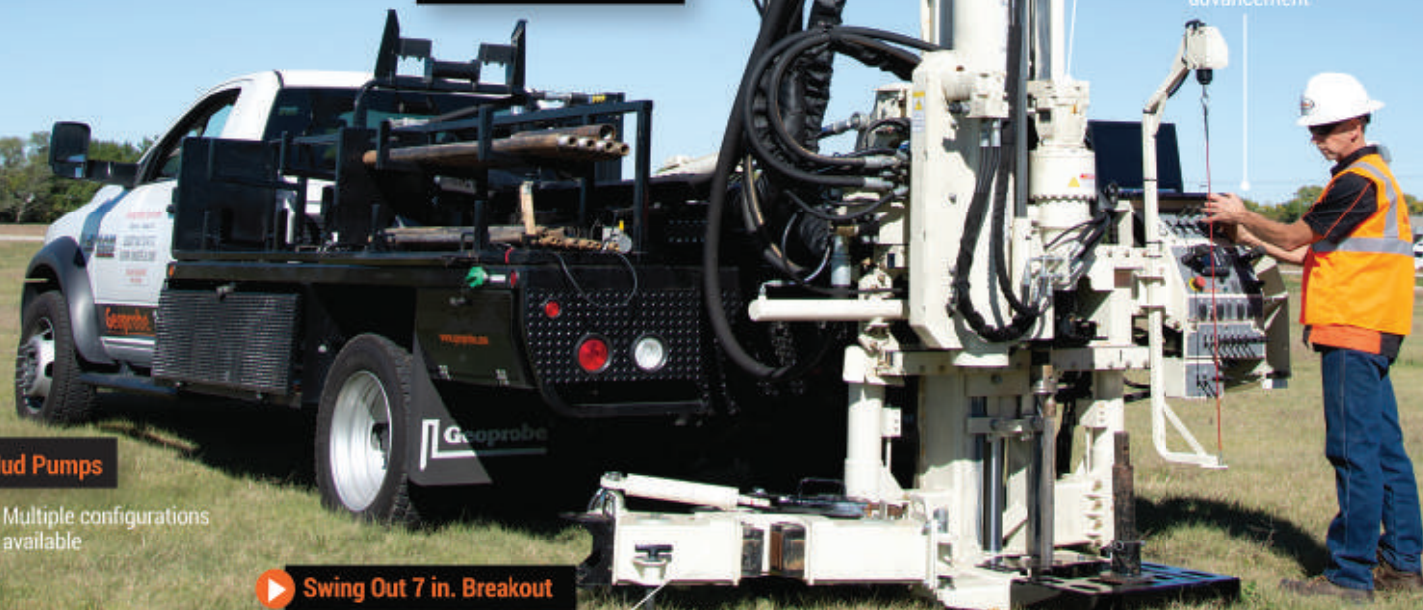
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*WWD&R photo of Gary and his wife Marilyn at the recent Michigan Ground Water Assn event.*

## When Groundwater Scientists Take the Stand on PFAS, Who Will Be Believed?

by Gary L. Hix, R.G., CWD/PI  
In2Wells, LLC

ENV

The latest contaminant related to groundwater in the headlines is the one referred to as PFAS. These letters stand for a series of chemically complex compounds most people had never heard of a few years ago. Perfluoroalkyl and Polyfluoroalkyl Substances, also known as PFOS and PFOAs, jumped into the headlines when they were found to be present in our drinking water. There are multiple potential sources of these compounds. It is being detected in both surface water and groundwater and has been found in plants, animals, air, and soil. It has even been detected in trace amounts in the blood and tissues of humans. PFAS are being detected and measured in water as low as parts per trillion.

As of this writing, none of the chemical compounds classified as PFAS have an EPA (Environmental Protection Agency) threshold of acceptable limits (called maximum contaminant level or MCL) for drinking water. The research has yet to be conducted and proven, to set EPA standards for public drinking water. This particular compound is typically found at such low detectable levels, the sampling procedures and approved analytical testing methods have not been written. Plus, at present, there is no clear evidence of the direct impact of consumption of trace amounts of these chemicals on human health.

The day will come when groundwater science experts will be called upon to explain in court how PFAS got into our groundwater, soil, and into our bodies. They will be asked to testify as to how much PFAS are in the groundwater, and if certain individuals might have consumed it. They will be asked to describe how they sampled and tested for these chemicals. The occurrence, movement, and detection of groundwater is not clearly understood by many people, including jurors, lawyers, and some judges.

For years, courts have grappled with the issues of just what scientific data can be seen or heard by a jury. It's almost as if the courts are treating groundwater science as a scripted TV "reality" show. Scientific facts, when reported by experts, should not have an interpretative conclusion. The conclusion of the facts is too often the one people choose to believe. True science is not open to further interpretation or different conclusions. Scientific facts are as undeniable as the answer to a mathematical calculation such as two plus two is, and always has been, four. Lawyers, politicians, and a few others may try to say two plus two can sometimes be three.

A February 2019 article in *The Wall Street Journal* brought out several disturbing thoughts about the future of the presentation of scientific data in courts. It was reported that the latest trial regarding the herbicide "Roundup" was going to focus solely on the science of the product being a carcinogen which caused a specific form of cancer, and not the question of any negligence on the part of the manufacturer of the product. The judge ruled that the issue of occurrence and movement in groundwater in the same argument as product liability was too complex for most people to understand and render a true judgement.

The first groundwater scientists to testify the PFAS compound has been detected in someone's drinking water could face a significant challenge to explain their findings, just as experts in DNA testing and analysis were questioned early on. Today, the public and the courts are still questioning which experts are correct regarding man-caused climate changes.

What defense strategies will be used to challenge the groundwater scientist's conclusion to protect the manufacturers and suppliers of the products which contributed to this widespread contaminant? What past statement, group membership, or earlier writings might the opposition's lawyers use to discredit the qualifications of a groundwater scientist as an expert presenting an unbiased opinion? Would the jury believe his or her testimony in a trial involving a particular corporation's chemical disposal practices if they learned the groundwater scientist was either a liberal or conservative? Let's not kid ourselves. This is how science is being looked at in the public eyes, and it is often the way it is being decided in court. When the time comes for groundwater scientists to testify in court about PFAS, who will be believed?

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

*Gary*

Gary Hix may be contacted  
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## Oil/Water Exploration

by Harold White

EXB

To lighten things up, I wanted to share a funny call I got recently:

Me: Hello, this is White Water Well Drilling. May I help you?

Client: No, I want you to do it.

Me: Well, what do you want?

Client: I want you to drill a well.

Me: Okay, I can do that. Where do you want the well drilled?

Client: In the ground, where else would you drill? All wells are drilled in the ground.

Me: I mean, where is the location you want the well drilled?

Client: Out by the barn on the east side.

Me: Tell me your address and I will drive over there and you can show me, and then we can talk about this.

Client: Okay, my address is . . .

So I thanked him and went to see him. He was a really nice older man who was a little hard of hearing.

Now back to this month's article . . . We have been snowed in for days, power lines are down and no electricity in town or our house. It's very cold - so we just put another blanket on the bed pretending we are camping out. Try not to think of anything unpleasant - just think happy thoughts and enjoy the beauty of it all. A little global warming sure would be nice here and now. My feet are freezing, my hands are freezing. Just be happy.

We are getting calls for help, asking if we can get a well running - they don't have any money, but would really appreciate a little help. So we loaned them a generator, gave them a can of gas, thawed out the frozen pipes, and got them running water, hoping everything goes wells after that.

We had our whole drill crew out to clear a road to a house to help a woman and her mother, who uses a wheelchair. It took six people with chain saws, brush cutters, shovels, rakes, and so on to do the rescue job. They had been stranded in the house for days and were happy to get out and go to town - they were very thankful and appreciative.

Many people are snowed in, that's why we are donating our time. I don't know how many thousands of big trees are down, and more are still falling.

[Publisher's Note: So proud of Harold and his family for paying it forward. More of us should do the same - it will make us all feel better.]

*Harold*

Harold White may be contacted via e-mail to [michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)

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## Second Chances

by Tim Connor

We all need a second chance from time to time. How about a third one? Or more? Ever had a second chance and ignored it? Ever had a second chance and in hindsight realized it positively changed the trajectory of your life in some way? These questions are not redundant. We all get second chances and often even more - that we ignore, don't realize, or even spurn for a number of reasons.

How about a second - health chance? How about a second - career chance? I know you are getting bored by my questions - see what I mean? I'm just trying to set the foundation for this article and you have lost your patience for giving me a second chance - or I have touched a sore spot in your life and you wonder where I'm heading? Either way, the entire question of second, third, fourth, or 100th chances is moot if we don't see the need to evaluate them or consider them. If I had to bet, there is some area of your life right now where you wish you could have a second chance. Am I right?

What exactly is a second (or another) chance? It can be a new beginning, a new ending, a new opportunity, or a new life lesson - painful or cheerful. It gives us the choice to leave a path which may or may not be working or beneficial. Or the option of fixing a previous mistake, failure, bad decision, or choice and/or accepting responsibility for our life as it is unfolding.

Life has given me many second chances - some I embraced and many I ignored, but in the end, they all came into my life for a reason - to help me get wiser in some way, to teach me something I needed to learn, and to help me to let go of ego, arrogance, insecurity, immaturity, or any number of emotional, financial, relationship, and/or career behaviors that in the end, if they didn't change, would have come to a negative conclusion in some way.

Risk, uncertainty, and change in our life circumstances cannot be avoided. We all must face some unknowns and do the best we can with them given our education, history, skills, courage, faith, etc. In the end, we will all make some dumb decisions or bad choices sooner or later, it's who we are. But life is seldom final. It helps us, if and when we are ready, to improve, grow, change, adjust, etc. and learn from our mistakes, failures, and bad choices or decisions.

Life also will not prevent us from experiencing the lessons or consequences of these poor actions, choices, or behaviors as this is one of life's ways of helping us learn, grow, and change. But it still gives us a choice. Life says: "Learn from this or you will continue to bear the consequences of these actions until you do. I am giving you a second chance. Don't blow this one."

When fear of change, risk, or uncertainty rules our life, we close ourselves off to many of life's opportunities and blessings. However, we must not see second chances as simply a way to escape from lessons which need to be learned.

So, you are in a dead-end job going nowhere, and a previous employer offers you a new position with more income and no hard feelings about the way you previously left. Take it or not - that is the question.

A previous spouse wants to try again to make it work this time, and they say they forgive you of your transgressions. Say yes or no?

Life is filled with these types of options and choices. So what do we do? I can't tell you how to approach second chances, all I can tell you is what I have learned. Sometimes they work out well and sometimes they don't. So how do we know which road to follow? Listen to your gut. Ask yourself: "What really feels right? What makes sense? What would I do if I was smarter, wiser, younger, older, poorer, richer." Get it? Just keep asking yourself questions, and I will guarantee, sooner or later, the best or right answers will come - do it, don't do it, wait, get more information before you decide, or some other approach which often seems to come from nowhere.

Sooner or later we all get second chances, so the question is not whether we have them or deserve them, but what do we do with them.

In His service,

*Tim*

To receive Tim's weekly FREE motivational booster articles, contact him at [www.timconnor.com](http://www.timconnor.com) with "please add me to your free booster e-mail subscriber list" in the subject line. Or contact him via e-mail to [michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)

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## 5G Network Ramps Up Remote Control Technology

*Adapted from Information by Volvo Construction Equipment*

Sweden's first 5G network for industrial use has been launched through the efforts of Telia, Ericsson, and Volvo Construction Equipment (CE). These companies have worked together before to deploy technology to improve the safety and efficiency of mining. As mentioned in the [March 2019](#) issue of *WWD*, Volvo CE will be one of the first in the world to use 5G technology to test remote-controlled machines and autonomous solutions at their facility in Eskilstuna, Sweden. This could lead to new applications within the industry.

"With extremely short response times, high capacity, and a high level of accessibility to the mobile network, commercial and standardized 5G technology can be used for applications such as remote control of heavy machinery in real time. This opens up new opportunities for greater efficiency, cutting costs, and reducing risk in hazardous environments. 5G enables us to create a safer, more efficient, and sustainable society. In cooperation with Telia and Volvo CE, we are now putting theory into practice in Eskilstuna. The 5G technology is ready for the world to switch on," said Magnus Frodigh, head of research for Ericsson.

The network will be used to continue the development of remote-controlled construction machinery and fully automated solutions. It will also be used to increase understanding of how connected machines can improve the industry as a whole. "Automation has several levels, and having 5G is an important technical support to enable us to drive development in this area. These trials in Eskilstuna will include the remote control of a conventional wheel loader but also further tests of the HX2 concept load carrier," explained Melker Jernberg, president Volvo CE.

The lag time with current remote-control technology makes it difficult to control at high speeds or with high precision. Bringing 5G online will make fully-automated systems safer and easier to use. "We can see that the industry's interest in 5G is considerable. Automation of the entire flow will mean new ways of working, and greater gains from efficiency. But to connect business-critical machines and vehicles requires a solution that is able to handle the massive amounts of data with guaranteed connection. That is what 5G can give us. And we are proud to lead the 5G development in Sweden together with our partners," stated Anders Olsson, CEO of Telia Sweden.

Although the testing is being done locally in Eskilstuna, the applications will be implemented globally. According to Melker, connected machines and autonomous solutions are the future. They provide more efficient production, logistics, greater flexibility, and a safer workplace. "By minimizing the potential safety risks and downtime associated with sectors such as mining, we can get closer to our goal of zero emissions, zero accidents, and zero unplanned stops. It will be exciting to see how far 5G can take us on that journey," he concluded.

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## Tales from the Field

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



### Shifting Property Boundaries

It is hard to imagine working in the field before the advent of GPS and the convenience of Google aerial photos and related tools. In the past, although there were parcel maps and records of surveys in local county archives, this information was rarely available in the field during a preliminary site visit. Often, on large properties such as ranches, the only way to verify land boundaries for a proposed water well location survey was to meet the land owner or ranch manager in the field.

Sometimes this involved a long trip from the office, with no guarantee this activity would develop into a project. In riding around the property, the owner or manager would point to an object off in the distance and say something like, "Over there is a fence corner, being the southeast corner of the ranch, and then you can see the south boundary line along the top of the ridge . . ." Or some similar comment. Later it might be found that the fence lines did not exactly match the property boundary lines, based on a boundary survey.

In one instance, a water well was drilled inside a fence, thought to be the property boundary. The owner of the property was pleased at the outcome of the well, but was not so happy when a later survey indicated the well was actually ten feet into the neighbor's parcel. To avoid a dispute which might have ended in court, the two parties involved decided to share the well. We never found out how long this peaceful solution may have lasted.

In another instance, we thought we had a property description correct on a potential project based on a telephone discussion with the owner and other information he provided. When we arrived at the site to proceed with the work, in discussion with the owner, we thought the "search area" was around ten acres, but found we were mistaken by a magnitude of ten . . . it was more like 100 acres in size! This error in judgement called for additional field and office time to complete the project at our expense.

In the past, it seems, we often had to gain experience "the hard way". Now, with GPS coordinates in hand during planning of such a project, this error would not have occurred. Sometimes, the way we worked in "the good old days" is best forgotten, in favor of using all the modern technology that is now available to us.

*Jeremy*

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# Notes from the Groundwater Guy

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



## Stainless Wells

Recently, I talked about why a well constructed with more expensive but durable materials may be the least expensive well over its life span. This is due to the fact that some of those more expensive materials typically last longer and have longer well rehabilitation intervals than less expensive materials.

One place where we see people trying to save costs on well construction is through the use of mild steel casing coupled with stainless steel screens. On the surface, it seems like a good way to reduce the up-front cost of the well since the mild steel casing may be a half to a third the price of the equivalent stainless steel. The problem, of course, is galvanic corrosion, an electrochemical process in which one metal corrodes preferentially when it is in electrical contact with another. Ultimately, this will manifest itself as pitting and holes in the lower quality steel. The rate of the corrosion can be accelerated by groundwater more conducive to corrosion.

While stainless steel may not always be necessary, the use of dissimilar metals in well construction should be avoided. If a corrosive environment exists, then stainless should be the material of choice. The Langelier Saturation Index (LSI) test is one way to determine the potential corrosiveness of groundwater. The LSI takes into account alkalinity, pH, calcium, total dissolved solids, and water temperature to determine the potential for the groundwater to form mineral incrustations (positive LSI) or be corrosive (negative LSI). We often run an LSI test during test hole drilling, but an indication of corrosion potential can be obtained using an LSI result from a nearby well also.

A good example of this is a well we recently assessed which was having severe sanding issues. There was a discrepancy between the well drilling log which showed the use of stainless steel casing between two screened intervals of wire-wrap stainless steel, and the actual construction of the well, which indicated mild steel had actually been used instead of stainless. A dynamic well video survey taken under pumping conditions showed substantial corrosion in the casing interval, with large holes allowing water and sand to pour into the well casing as the well was drawn down during pumping. Substituting mild steel casing in this well for stainless has resulted in a substantially reduced life span of the well or, at a minimum, a large expense for well repairs.

*Tom*

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## Too Much Integration

by Britt Storkson  
Owner, P2FlowLLC

C&G

What is integration? It's a fancy way of describing the process of taking many components and making one product from them. Example: "Integrating" remote control functions into a toy car.

A few weeks ago, I got a call from a friend in north central Montana. He said one of their heating systems had failed and wanted to know what I thought the best way would be to deal with the problem. From the description he gave, it sounded like the thermostat had failed.

I then asked him why he didn't simply replace the thermostat for about \$20? He said he couldn't do that because it was "integrated" - meaning every component depended on every other component, and if one component failed or wasn't there, the rest of the system wouldn't work.

The system manufacturer had a solution: Replace the entire control unit for \$2200! So my friend was faced with paying for the replacement - an entire control unit - because of the failure of one small component which "took out" the rest of the system. Sounds like a raw deal for the system user, but a great deal for the system seller.

To compare, let's consider computer controls for water pumping. Basically, the only thing that fails once in a great while are the pressure sensors. Sometimes they get submerged or damaged by freezing. One could easily claim the failure of the sensor required the replacement of the entire control unit. How would the customer know it wasn't true? But that wouldn't be ethical; a good reputation and name is more valuable than making sales.

Sometimes vendors use specialty connectors or odd pressure ranges to force the customer to buy replacement parts from them at much higher prices instead of much less costly but good quality "generic" parts available from a variety of sources. For example, a standard pressure sensor pressure range is 0-100 psi (pounds per square inch). One company uses a non-standard 0-120 psi pressure sensor, but this also makes replacement more difficult and costly for the end user.

Standard pressure sensors are widely available, and can be fit it with "keyed" connectors which can only go together one way. If the connector is damaged, the customer can "wire nut" the two wires together if needed. If this sensor is hooked up backwards, it won't work - but it won't hurt anything either. If it doesn't work, you can simply switch the wires so it does work. This makes it very easy to coach the customer over the phone because it is simple and there is very little that can go wrong.

Good controls development often involves making the individual components easily identifiable and replaceable. It is possible to test the sensor periodically; and if it's a problem, then indicate it on the display. Wisely selecting connector components makes replacement easy and inexpensive.

The job of a good controls developer is to make the computer do as much as possible so the customer needs to do as little as possible to make things work.

This often requires leaving off components rather than adding them. It doesn't mean we do not ever add components, but as my English teacher once said about adding commas in a sentence, "When in doubt, leave them out."

*Britt*

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Photo by David Becker.



Technology such as artificial intelligence (AI), robotics, and autonomous machinery is making an impact in industries all over the world, including the gas and oil industry. According to research by KPMG, gas and oil CEOs actually see the potential technological disruption as more of an opportunity than a threat, but admit more work needs to be done.

Applying new technology is already underway in some applications. As a matter of fact, 85% of gas and oil CEOs report they have already implemented AI, or are piloting AI for some processes, while only 59% feel their company is active in adopting new technology.

"Technology is disrupting the status quo in the oil and gas industry. AI and robotic solutions can help us create models that will predict behavior or outcomes more accurately, like improving rig safety, dispatching crews faster, and identifying systems failures even before they arise. This level of predictability can have a profound impact on our industry," said Regina Mayor, global sector head, Energy and Natural Resources, KPMG.



Industry confidence is up and CEOs are setting their sights on growth opportunities, with 85% being confident in continued industry growth and 88% being confident in their company's own growth prospects.

When CEOs were asked about the long-term benefits of AI, nearly half of them said acceleration of revenue growth. Other ben-

efits mentioned include increased agility and improved risk management, all within a three-year time frame. So, what about the human factor? The majority of gas and oil CEOs believe technology will actually create more jobs than they eliminate.

As oil prices remain high, industry confidence is up and CEOs are setting their sights on growth opportunities. "The higher price of oil is playing a significant role in driving a more positive sentiment across the industry," said Mayor. "Executives are really honing in on ways they can improve internal efficiencies . . . and the use of robotics, AI, and other means of digitalization across the industry."

The outlook isn't all positive as CEOs consider the emerging / disruptive technology risk, environmental / climate change risks, cybersecurity, and other factors as threats to achieving growth. Another concern for long-term growth is the need to appeal to future consumers, Millennials in particular. CEOs are concerned about whether they can understand and meet the needs of Millennials and when asked about the key challenges of meeting those expectations, nearly half said they struggle to understand how the needs of this generation differ from older customers. Listening to the needs of new generations will be critical as organizations shift their attention to a generation of consumers who have used the Internet most of their lives and are very familiar with technology.

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# The Un-Comfort Zone II

by Robert Evans Wilson, Jr.



## How to Know Who You Can Trust

In my last article, I wrote about loyalty, which got me thinking about trust. I wondered who is in my life that I trust, and who I don't trust. It didn't take me long to realize I trust everyone in my life, because I shed those whom I don't trust.

As I pondered trust, I recalled a woman I once dated, who told me she was a widow. Later on, I learned from an independent source she was divorced, not widowed. When I inquired about this discrepancy, she admitted she was divorced, but her ex-husband died a year or so after their divorce, so she figured it qualified her as a widow. If she wanted to consider herself a widow, that was fine with me, but the problem was my trust was broken, and I started questioning the veracity of all her stories. As Friedrich Nietzsche observed, "I'm not upset that you lied to me, I'm upset that from now on I can't believe you." Unsurprisingly, a month later, we were no longer dating.

When I was in college, I was riding in the car with one of my closest friends when he was pulled over by the police and arrested for driving under the influence of alcohol. I had to call my parents from jail to come pick me up. A few months later, I was riding with him again, when he was pulled over for speeding. The policeman searched his car and found some marijuana in the console and arrested him. I felt lucky I wasn't arrested too. Nevertheless, I had still had the embarrassment of having to call my parents to come pick me up at jail again. After that incident, my trust was broken, and I quit riding with him. Whenever we went somewhere, I always insisted we go in separate cars. A few years later, on an occasion when we had agreed to go out for lunch, he showed up at my house and offered to drive. I said, "You know I won't ride with you." He then replied, "It's not a problem anymore; with my new car, I never get pulled over." Curious, I asked how that could be. So he explained he had purchased a used police car, had it painted and outfitted to look like an unmarked patrol car, and ever since he hadn't been pulled over even when speeding past a radar-trap. It was not enough to restore my trust, and we continued on to lunch in separate vehicles as usual.

Before our trust can be lost, we first have to give it. For some people, we make them earn our trust, but for others, we freely give it away. According to ChangingMinds.org: "Trust is both an emotional and logical act." On one hand, it is a feeling. If we have some familiarity with a person, that is if they share something meaningful with us such as culture, values, or even community, we are more likely to give them our trust without expecting them to earn it first.

According to author, Simon Sinek, "When we're surrounded by people who believe what we believe, something remarkable happens, trust emerges." On the other hand, before we are willing to do business with a stranger, we want some assurance they will provide what is expected.

The motivation behind trust is to find someone who cares enough about us that we can rely on them. But this desire involves risk. When we trust someone, we make ourselves vulnerable to that person. We give that person the power to hurt us. Do you know if the person you want to trust cares about you? If not, then you might want to make them prove their trustworthiness first.

Trust, like loyalty and respect, is a two-way street. If you want other people to trust you, you must give them reasons. The Golden Rule: "Do unto others as you would have them do unto you," is a great place to start if you want to create trust.

We foster trust within another person by being reliable or predictable - especially if we are seeking to do business with them. You earn trust by delivering what you promised, when you promised it. Trust may also require a certain level of expertise, ability, or competence. For example, people will not want to hire you as a doctor if you haven't been to medical school. Education, however, is seldom enough. It also takes having confidence in yourself and your abilities to build trust from others. And, if the person considering you for a job doesn't know you, then they will want to know someone who does know you. That's why referrals, recommendations, and testimonials are so important.

Trust is vital to the success of every relationship - whether it is personal or professional. In brief, being trustworthy means you keep your word, maintain your responsibilities, prove your competence, and . . . you never lie, cheat, or gossip!

## 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.RobWilsonSpeaker.com](http://www.RobWilsonSpeaker.com) or contact him via e-mail to [michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)

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## OIP-G Successfully Detects Coal Tar Fluorescence

*Adapted from Information by Geoprobe Systems®*

The Optical Imaging Profiler (OIP) is a direct push photo-logging system developed by Geoprobe®. It uses a downhole light source and complementary metal-oxide semiconductor (CMOS) camera to investigate for fluorescent contaminants through a sapphire window on the side of the probe. Intended for use in soils and unconsolidated formations, the OIP probe was initially developed with an ultraviolet (UV) light emitting diode for the detection of fuel fluorescence. Several common organic contaminants of concern (coal tars, creosote, bunker fuels) yield inconsistent results under UV light, but do fluoresce under green wavelength light. So Geoprobe® developed an OIP probe with a green wavelength light source - the OIP-G - in which the downhole camera acquires images of fluorescence at 30 frames per second, displaying them on-screen during logging. The images are analyzed for the percent area of fluorescence (%AF), and one image every 0.05 feet is saved to the log file. If there is no fluorescence, the images are dark.

The OIP-G probe includes a dipole electrical conductivity (EC) array for the measurement of bulk formation EC. The EC and %AF logs are displayed onscreen along with the images of fluorescence as the probe is advanced.

Geoprobe® coordinated with Gary Richards and Jonathan Stephenson of the Kansas Department of Health and Environment (KDHE) and their contractor GSI Engineering of Wichita, Kansas, to conduct a test of the OIP-G system at the former manufactured gas plant in Wellington, Kansas.

The site is underlain by clay-rich alluvium with silty to sandy interbeds to a depth of about 30 feet with Permian Age shale as the bedrock. OIP-G logs were completed at 39 locations to depths of up to 33 feet. Logs from the Wellington site revealed the presence of significant fluorescence at several locations and depths. Sampling was performed at selected locations and targeted depths based on the fluorescence logs. The samples collected with the Geoprobe® DT22 soil coring system were submitted for analysis of polycyclic aromatic hydrocarbons (PAH), which

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*Members of GSI Engineering and the Kansas Department of Health & Environment running an OIP-G log in front of the former manufactured gas plant building, which has been converted to a railroad museum.*

are also known as polynuclear aromatic hydrocarbons. Lab analyses revealed the presence of elevated PAH concentrations in most samples.

Importantly, sampling revealed false positive results (up to 40%AF) were detected at a few locations. Bench tests with dilute hydrochloric acid revealed the false positive results occurred due to the presence of calcareous minerals. The fluorescence of calcite is well-documented. Inspection of the targeted core samples quickly verified the presence of coal tars, calcareous sediments, caliche nodules.

Following fieldwork, cross sections with EC and %AF logs helped to define the presence and distribution of coal tars in the subsurface and identify preferential migration pathways. These results indicate the OIP-G system is a useful tool for investigation of facilities with coal tar contamination.



# Frequently-Used Geological Terms Part 81

*Glossary Adapted from the Dictionary of Geological Terms*

## R

**Residual Soil** - Soil formed in place by the decomposition of rocks like those around it.

**Resistates** - Sediments composed of chemically resistant minerals, enriched in weathering residues; highly quartzose sediments characteristically rich also in zircon, ilmenite, rutile, and occasionally cassiterite, monazite, and gold.

**Resolution** - A measure of the ability of geophysical instruments, or of remote sensing systems, to define closely spaced targets.

**Resorption** - The partial or complete refusion or solution, by and in a magma, or previously formed crystals or minerals with which the magma, owing to changes of temperature, pressure, or chemical composition, has ceased to be in equilibrium.

**Resources** - Reserves plus all other mineral deposits which may eventually become available. Either known deposits which are not recoverable at present, or unknown deposits, that may be inferred to exist but have not yet been discovered. They represent the mineral endowment, global, regional, or local, ultimately available for use.

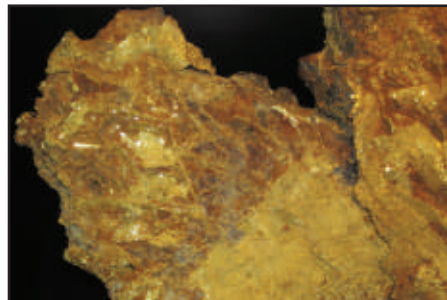
**Resurgence** - The point where an underground stream appears at the surface to become a surface stream.

**Reticulate** - A vein or lode with a netlike structure. This term is also used to describe a rock texture in which crystals are partially altered to a secondary mineral, forming a network that encloses remnants of the original mineral.

**Reversed Polarity** - A natural remanent magnetization opposite to the present ambient geomagnetic field direction. Also used to describe a configuration of the earth's magnetic field with the magnetic positive pole, where field lines leave the earth, located near the geographic north pole.

**Reworked** - Said of a sediment, fossil, rock fragment, or other geologic material that has been removed or displaced by natural agents from its place of origin and incorporated in recognizable form in a younger formation, such as a reworked tuff, carried by flowing water and re-deposited in another location.

**Rg Wave** - A slow, short-period Rayleigh wave which only travels along a nonoceanic path. The "g" refers to the granitic layer.



*This gold vein stockwork is an example of reticulate. Photo by James St. John.*

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for more terms  
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## A Consultant's Perspective

by **Edward E. Everett, CPG**  
*Strata Environmental Services, Inc.*

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The **WWD** Team welcomes Edward Everett as a contributing writer. He has a master of science degree in geology, specializing in hydrogeology. He is a member of the American Institute of Professional Geologists, Michigan Ground Water Association, and National Ground Water Association. Ed is founder and president of Strata Environmental Services in Mason, Michigan; and is also a partner at Blackhawk Geophysical Services. Here is his first article:

When my career in hydrogeology started 42 years ago, I had the great privilege of working with some very good well drilling professionals who taught me more about well design and installation procedures than any college coursework could. The company I worked for had a number of drill rigs, primarily focused on the environmental monitoring field, but I did run rigs for a number of years and learned from that experience as well. Our company (which consisted mostly of geologists/hydrogeologists) was often hired to develop large water supplies, and it was our responsibility to hire the drilling contractor, conduct test borings, design the production wells, oversee the drilling and well installation, run aquifer tests, and complete the aquifer analyses. Unfortunately, times change and the completion of a well is a "small" part of the total project, which likely includes the water distribution system and possibly water treatment. The engineering design and infrastructure installation costs far exceed the cost of installation and testing of water wells. We frequently get hired as a subcontractor to the drilling firm, and have little say in the design of the wells - just verify the drilling company is doing their job.

Hydrogeologists are tasked with evaluating the groundwater resource, predicting the sustainability of that resource, and assuring no adverse resource impacts occur (limit surface water depletion). With computers and limited data, we can make all kinds of predictions, and this appears to be the method preferred by regulatory agencies here in Michigan (hopefully not many other places). As scientists, we are seldom able to obtain enough data to satisfy our thirsty minds, mostly because of financial limitations. However, most of us are realists and understand some limitations. As an industry, the professionals in the water supply fields (drilling contractors, geologists, and engineers) need to push for sufficient funding to collect better hydrogeologic data which will allow for a much better understanding of the hydrogeologic system, to make better predictions - based on real data - of the sustainability of the resource.

What does this involve? 1. Push to make sure at least one test bore is drilled through the entire aquifer thickness, even if the formation becomes less desirable (finer sand, no fractures in the bedrock, etc.); 2. Keep accurate drill logs, including what the base formation was (aquitard); and 3. Good aquifer test data.

Geophysical logs of a test bore on-site takes some of the subjective formation descriptions to a common denominator, but (at least in Michigan) they are not required and often not specified.



**Ed** Ed Everett may be contacted via e-mail to  
[michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)

### Recipe Corner

*Courtesy of the Texas Ground Water Association Ladies  
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#### Cheesy Slow Cooker Potatoes

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## Drilling Into Money Not Boring

by Mark E. Battersby

### The Two Sides of Independent Contractor Misclassification

Employers have long preferred to treat workers as independent contractors, reaping payroll tax savings, no fringe benefits, or other expenses associated with employees. By the same token, workers - including the owners of many drilling businesses - could potentially lower their own tax bills by shifting from being an employee to independent contractor.

Drilling businesses that want to reduce costs by using independent contractors need to be sure these workers really aren't employees. And, while the 2017 Tax Cuts and Jobs Act contained a special 20% deduction from the income of independent contractors operating pass-through businesses, such as S Corporations, LLCs, and partnerships, many workers, as well as business owners, are eyeing the lower tax bills which might result from shifting from being an employer to independent contractor.

Obviously, this is not an easy decision. First, the 20% deduction from pass-through income generally occurs only as long as taxable income is less than \$157,500 for an individual or \$315,000 for those filing jointly. What's more, switching to independent contractor status might mean the loss of valuable benefits normally provided by - and deductible by - employers.

Although independent contractors are a proven way for employers to achieve workforce flexibility and save money, they are also a popular strategy providing drilling professionals a great deal of flexibility and, in many cases, lower tax bills for those choosing independent contractor status for themselves. Those lower tax bills and the difficulty in determining who is and who isn't an "independent contractor," explains the "misclassification" crack-down.

Generally, a worker doesn't qualify as an independent contractor if he or she performs services which are controlled by the employer. The relationship itself is another factor. Are the individual's services a key aspect of the drilling operation's regular business? How do the individual's assignments compare to those of the operation's full-time worker/employees?

Fortunately, the Internal Revenue Service and the courts look at the totality of circumstances. In other words, if all the criteria point toward the worker being an independent contractor, the fact the worker is paid by the hour won't necessarily turn this into an employer/employee relationship.

Just as every business should be careful to distinguish between employees and independent contractors, so should every drilling business when choosing independent contractor status as a pass-through entity. Professional assistance may be required to ensure you and/or your workers are clearly "independent contractors."

*Mark*

Mark E. Battersby may be contacted  
via e-mail to [michele@worldwidedrillingresource.com](mailto:michele@worldwidedrillingresource.com)

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## Through the Front Door!

by Jim  
Kuebelbeck



As the readers of *WorldWide* probably know, I wasn't always a water dows-er. Our experiences in life make us who we are, and everything that happens along the way contributes in some way to what we ultimately become as a person. I believe we are all born with different talents and abilities, and it is solely up to us to discover and develop these unique inborn talents to a level whereby they can be of benefit to ourselves or others.

Some years ago, I was stationed at the Naval Air Station in Brunswick, Georgia. Besides enjoying some of the local beaches, many of the airmen played a lot of pool in the establishments around town. Shooting pool was quite popular in the area at the time, and some of us had actually become quite good at it (me included, if I say so myself) and I often somehow managed to beat some of the other airmen in the squadron.

At the time, Willie Mosconi, one of the best-known "pool sharks" in the United States, agreed to put on an exhibition in one of the local pool halls. The event was widely publicized, and many of us on the base looked forward to his exhibition. To us, it was going to be a once-in-a-lifetime opportunity to see a true professional, and many of us airmen came into town to witness the event.

Before Willie began his "show" he asked if anyone wanted to volunteer playing with him. No one raised their hands. Then, in an effort to embarrass me, some of the other airmen in the audience (whom I had beaten in the past), pointed to me and loudly said, "He will!"

More than a bit red-faced, I reluctantly agreed, and walked over to the pool table. Willie told me he'd play a little "rotation" (where we'd each have to shoot all the numbered balls in sequence; one through fifteen). He told me I could break.

I really slammed the cue ball, and the balls went all over the table - but none went in. Then Willie unceremoniously proceeded to clean the table from 1 through 15. I vividly remember the cheers and jeers and laughter from my so-called friends. Willie then suggested we play a game of "8 ball". I didn't manage to get any balls in the pockets in that game either, but I did get a smile and a handshake from Willie, which was reward enough I guess.

In retrospect, I believe some of the guys were jealous of me, after the fact, but at least I can always say I shot pool with one of the greatest pool players of all time, and it remains forever in my memory!

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

*Jim*

Jim Kuebelbeck may be contacted  
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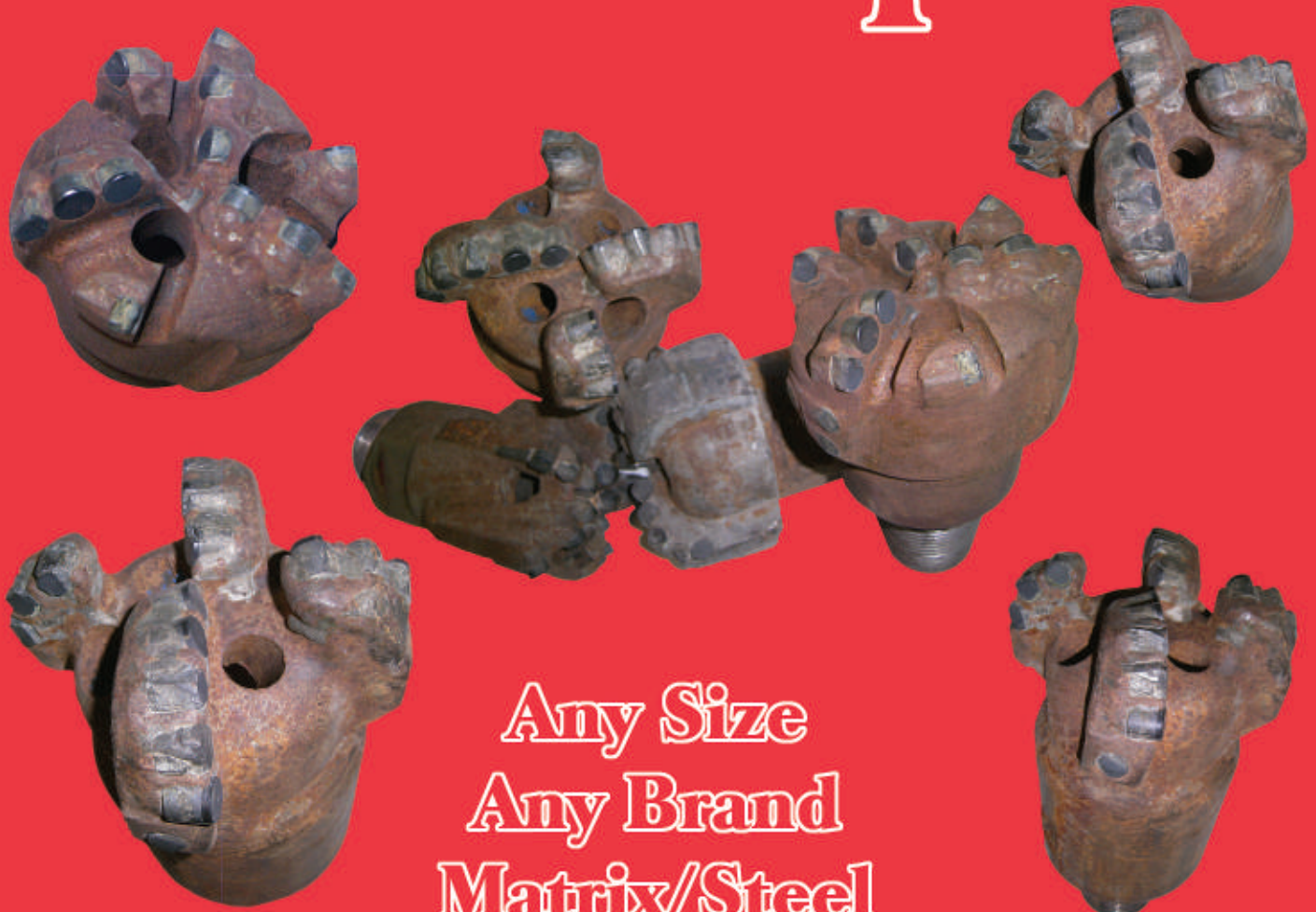


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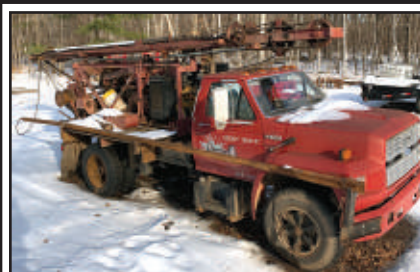
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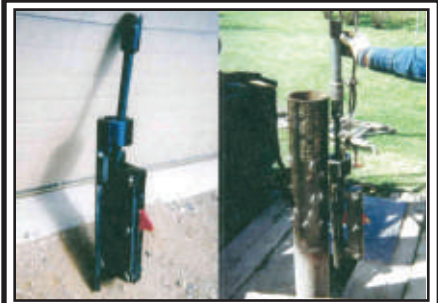
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## Recipe Corner

*Courtesy of the Texas Ground Water Association Ladies Auxiliary - Women of Water*

### Banana Drop Cookies

- 1½ Cups Sugar
- 2/3 Cup Shortening
- 1 Teaspoon Vanilla
- 2 Eggs
- 1 Cup Mashed Ripe Bananas
- 2-1/4 Cup Flour
- 2 Teaspoons Baking Powder
- 1/2 Teaspoon Salt
- 1/2 Teaspoon Baking Soda
- 1 Cup Chopped Walnuts
- 1/2 Teaspoon Cinnamon

Preheat oven to 400°. Grease cookie sheets. In a large bowl, beat 1-1/4 cups of sugar, shortening, and vanilla until fluffy.

Beat in eggs, then bananas. Combine flour, baking powder, salt, and soda, beat into the sugar mixture. Stir in nuts.

Chill 30 minutes. Then drop by teaspoon two inches apart on cookie sheets. Combine 1/4 cup of sugar and cinnamon and sprinkle over cookies. Bake 8-10 minutes. Makes 5 dozen.

~ Debora Wagstaff



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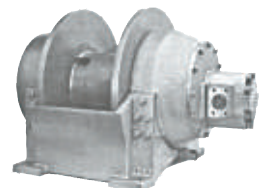
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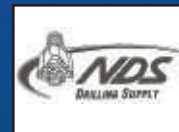
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