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This is the year 2019, and we predict it to be a terrific one for each of you. Of course it will be! You have the future ahead of you - no matter what it brings - we firmly believe in our drilling industry family, and what each one of you are capable of. Don't be held back by anything

~ step up to the plate and go for it! If by some chance, it doesn't work out ~ "Try, Try, Try Again." You learn more through failure than you do from success. If success came too easy, we would never learn anything new because we wouldn't have to.

We don't know anyone in our industry who just sits back on their laurels and has success. It comes from hard work and dedication to family, friends, and this great industry of ours.

The **WWDR** Team is stepping out on a limb once again. Trying new things is just a way of life for us. Sure, some things don't work out. We learn from that, and move ever forward to figure out new and different ways to help our industry. What is it, you ask?

Naw, I'm not telling you here - but you will know soon enough. Just remember, we don't do anything for ourselves ~ alone ~ or without each of you in mind. It won't be easy, but I truly believe this **WWDR** Team is up for the challenges it brings in **2019**. Join us won't you?

**Happy New Year!**

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With pen (computer) in hand . . . *Ronnie, Managing Publisher*

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## Featured Articles for January

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## A Knight's Tale: Medieval Sword Unearthed

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

C&G

An intact medieval sword from the 14th century was discovered in a peat bog in the Commune of Mircze, Poland. The sword was found by an excavator operator during drainage operations at the bog. While the weapon is extensively corroded, it is preserved almost entirely with the only piece not surviving to the present day being the hilt originally made of wood, bone, or antler. The sword's original weight is estimated to have been around three pounds, which is light for a weapon measuring four feet long. The elongated grip of the sword was intended for two-handed use, which when combined with its long reach and light weight, made the sword an agile weapon for armored knights in battle. This was a typical design of the 14th century.

The area of the discovery first appears on the historical record in the 13th century when it's mentioned as the site of a few hunting lodges surrounded by forest. The Polish governor built a castle in nearby Hrubieszów in the late 14th century, meaning the second half of the century would have offered good employment opportunities for knights, or perhaps the sword's owner had just been riding through the area and made a wrong turn into the bog.

The sword's finder donated the artifact to the local Fr. Stanisław Staszic Museum. "This is a unique find in the region," said Bartłomiej Bartecki, director of the museum. "It is possible that an unlucky knight was pulled into the marsh,

or simply lost his sword."

On the rear bar of the weapon there is an isosceles cross inscribed in the shape of a heraldic shield, which was probably made by the blacksmith as a kind of maker's brand. This symbol would normally not be visible since it would be on the portion of the bar covered by a hilt.

Archaeologists plan to perform limited excavations at the site of the discovery, which could reveal some of the missing elements of the knight's equipment, while shedding further light on the circumstances which placed the weapon in the bog. The sword will undergo conservation in Warsaw, which will help determine its owner and possibly the origin of the weapon. After the conservation and analyses, the sword will become part of the main exhibition at the Fr. Stanisław Staszic Museum. The director of the museum believes reporting accidental archaeological discoveries to competent, relevant sources is becoming the norm, and these discoveries are of exceptional scientific and artistic value.



Photos courtesy of  
Fr. Stanisław Staszic Museum.

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## Automate Something Because You Should

by Britt Storkson  
Owner, P2FlowLLC

I've written many times about both the positives and perils of computer-driven automation. Automation, when properly applied, is a wonderful tool and a great timesaver. However automation, when misused and abused, greatly increases the likelihood of errors and omissions, and often results in wasting power, materials, and far more of the operators' time than it saves - as well as creating new and unique safety issues.

In this article, I'm referencing "The Hazards of Going on Autopilot" by Maria Konnikova in *The New Yorker*, September 4, 2014. We'll start with the advent of automation systems in aircraft.

In 1977, the House Committee on Science and Technology identified automation as a major safety concern. What do they mean "safety concern"? Why, I thought automation improved everything! I would submit that automation, when properly implemented, will make any product or service better and less expensive to produce. The key here is "properly implemented". Poorly done or overdone automation can be worse than no automation at all.

Earl Wiener from the National Aeronautics and Space Administration's Ames Research Center cited the "let's just add one more computer" phenomenon. More computational ability does not necessarily mean better performance or a better product. The issue is not so much the computational "power" you have at your disposal. The issue is how you use these computational resources to service a given application.

I would liken today's computer technology to automobiles when they first came out in the early 1900s. At first, people were impressed with the speed and power of the automobile over the alternative. Just like today, people are impressed with the power and speed of computers. Back then, nobody cared much about fuel economy or the fact the average car weighed between 4000 and 6000 pounds because of crude metals fabrication and casting practices using more materials than needed to do the job. Over time, the economics of this practice caught up to the automakers and they started producing smaller, lighter, more efficient cars. They did this primarily by not changing the basic operation of the car, but by evaluating what did and did not need to be built into the car to get the desired result.

The article also brings up the problem that the more processes are automated, the more comfortable we get with them . . . in effect "ceding" our intellectual control to them. Take cruise control in cars. Does turning on the cruise control make you more aware of what is going on around you, or less?

Right now, we're using humans as backups to computers . . . a task humans are ill-suited for. Humans do not perform well in this role because of eventual fatigue - both mentally and physically. Our minds need constant stimulus to function at peak performance, and being a backup to a computer is the direct opposite of that ideal.

In an autopilot application, why not have the pilot fly the plane manually and use the computer to monitor the pilot's performance against the programmed procedure? Computers could even periodically test the pilots and note how quickly and proficiently they responded.



*The Consolidated Testing Laboratories crew was pleased to show their TH60 with the Epicroc Team of Sonne and Tom.*

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use the computer to monitor the pilot's performance against the programmed procedure? Computers could even periodically test the pilots and note how quickly and proficiently they responded.

The takeaways are, not all automation is good automation. Often, automation interferes with our ability to understand what is really happening in a given circumstance. The automation itself may be poorly understood, and the extra complexity creates problems of its own. In all critical applications there should be a way to bypass the computer and directly control the device from another source. Just because we can automate something doesn't mean we should automate something.

**Britt**

Britt Storkson may be contacted via e-mail to michele@  
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# Hot Off the Press

## Clearing a Mine Takes Time

With a population of less than 9000, the village of Batuah is one of the smallest in the East Kalimantan province of Indonesia. It is best known for livestock production - mostly chickens. However, coal mining has been on the rise in the area. Local mine owner PT Tambang Berkah Karunia (TBK) is working on a coal mining project using ten Terex TA400 articulated haulers to remove huge volumes of overburden.

The Terex TA400 is perfectly suited to perform in large-scale construction projects, quarries, and mine sites. Its six-cylinder engine is fuel efficient for low operation cost. All three axles are in permanent all-wheel drive for maximum traction for minimal driveline impact and wheel spin. Service is quick and easy with ground-level test points and a fully tilting cab, as well as an electronically raised hood.



"With the ground being so soft at the Batuah mine, we needed trucks that could perform in challenging conditions - and TBK's TA400 haulers enable us to do just that," explained Bhisma Dian Resnadi, operation manager for PT Berkarya Abadi Selalu, a subsidiary of TBK which is heading the project.

With the fleet of haulers working up to 18 hours a day, it is expected to take about five years to clear the mine.



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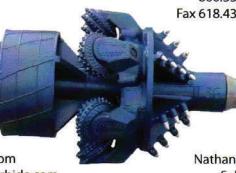
  
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JANUARY 2019

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## New Check Valve Now Available

Adapted from Information by Flomatic® Corporation

For more than 85 years, Flomatic® Corporation has been changing the industry and leading the market, manufacturing a full line of check valves for water and wastewater applications. Now they have another one! The company has brought their new Model 508S6 Ball Check Valve to market. This simple, yet reliable 316 stainless steel check valve features a full-ported valve seat uniquely designed to allow a strong phenolic ball to seat on a Nitrile (Buna-N) seat. For vacuum or antiflooding valve applications, an optional "floating" rather than "sinking" ball is used. Due to its simple, flow-efficient design, the valve is virtually maintenance free. The valve is commonly used in submersible wastewater lift station applications.

Bo Andersson, Flomatic's president is particularly proud with this new valve. "It was our goal to deliver a longer service life ball check valve; the Model 508S6 does just that. This new valve can be installed both vertically and horizontally, and the optional Flomatic® Auto-Vac Model 77 vacuum breaker makes this a one-of-a-kind valve. I am very proud of the work the team has done with this new valve."

Rated at 150 PSI and a MAX 180°F (82°C), Model 508S6 is available for immediate ordering on 1½-, 1¾-, and 2-inch sizes.



*The optional vacuum breaker mounted on the access port reduces hydraulic shocks (water hammer).*



## Environmental Monitoring

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

ENV

### Should all Water Supply Wells be Grouted or Sealed?

An argument can be made that all water supply wells should be grouted from their producing zone to land surface. An example of an exception might be where a new house is being built in the country away from human sources of contamination and there appears to be little or no risk of contamination. However, this would be a rare occurrence.

Most all wells have a small annular space between the sediments drilled and the well casing. Even the smallest of annular spaces (the 1/8-inch from a coupling) can provide a pathway for fluids to travel vertically down to the screen or open hole of a supply well. It can be argued, the concern of vertical movement of fluids is less of a problem with cable tool constructed wells (driven casing) versus rotary drilled wells where a casing (steel, PVC, etc.) is set in a larger open borehole having a one- to two-inch annular space. The cost and labor of grouting a rotary drilled well is more, but the probability of seepage of percolating water from above is much greater than a driven steel casing. I have seen many wells which experience significant turbidity (cloudy or unclear) problems due to water falling tens of feet along the annular space from above.

Mother Nature often provides a unique natural filtration system which helps provide crystal clear, bacteria-free water to be withdrawn from wells. Layers of sediment (sands) can filter fine particles and remove any turbidity. Percolating groundwater from the unsaturated zone (where oxygen is available) through the anaerobic (low-oxygen) zone below the water table is effective in killing most types of bacteria and viruses. Clays also help absorb metal ions and organic plant matter by absorbing

many types of unwanted metals and particles. An unsealed well allows "dirty" water to travel deep to the producing area of a well which can eventually be pumped to our drinking water supply.

Over time, even the most "pristine area" will experience growth and development which may be impacted by new source pollution. Unsealed wells can be a conduit for many sources of contamination, including septic tanks, animal waste, fertilizers, pesticides, leakage from fuel tanks, etc. A properly sealed well is not only a good investment, but a healthy choice as well.

*Tom*

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



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# BREAKING NEWS

## Vermeer MV Solutions™

Vermeer Corporation has purchased Florida-based Vac-Tron Equipment, LLC, a provider of vacuum excavation products. Vermeer Corporation is combining the company with McLaughlin Group, Inc., a drill tooling and vacuum excavation company based in Greenville, South Carolina, which was purchased by Vermeer in 2017.



The companies will operate under the combined group Vermeer MV Solutions™, while continuing to provide Vermeer-branded vacuum excavation equipment and technology through dedicated Vac-Tron and McLaughlin series product lines, as well as McLaughlin-branded utility accessories and auger boring systems.

Vermeer MV Solutions will operate under a combined leadership and sales team led by General Manager Dave Van Wyk. Leadership at both companies will come together and serve as a unified team. The Florida and South Carolina locations will continue production as they work together to meet the growing demand of customers.

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## WHO'S IN THE NEWS



California Groundwater Association (CGA) past president, Michael Meyer passed the gavel to incoming president, Dave Fulton.

Additional announcements from CGA, Underground Construction Technology (UCT), the New Mexico Oil and Gas Association, and the United Nations University Geothermal Training Programme are located in our online issue: [worldwidldrillingresource.com](http://worldwidldrillingresource.com)

Send your Who's in the News to: [bonnie@worldwidldrillingresource.com](mailto:bonnie@worldwidldrillingresource.com)

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## Can Chemical Oxidation Help with Soil and Well Contaminations?

Adapted from Information by the United States Environmental Protection Agency

Chemicals or mixtures of chemicals which are heavier than water and are only slightly soluble in water are called dense nonaqueous phase liquids (DNAPLs). When these chemicals are released into the environment in sufficient quantity, they will move through soils and groundwater until they encounter a resistant layer, which will impede further vertical movement and allow the liquid to pool. These chemicals are the most common form of contamination or spill encountered, and the resulting pools become slowly dissolving sources of groundwater and soil vapor contamination.



*Drilling sample of a dense nonaqueous phase liquid, courtesy of U.S. Geological Survey.*

tive required to increase effectiveness?

- What is the soil oxidant demand? Soil oxidant demand is a measure of how the naturally occurring materials in soil affect the performance of some of the oxidants. For nonselective oxidants, more oxidant will be required so the cost of cleanup will be increased.
- What is the naturally occurring pH of the soil/groundwater system? Some oxidants require an acidic environment to work. If the soil is basic, an acid needs to be applied in addition to the oxidant.
- How will the decomposition rate of the oxidant affect application strategies? Some unreacted oxidants may remain in the subsurface for weeks to months, while others naturally decompose within hours of injection.

The type of delivery system used for the oxidants depends upon the depth of the contaminants, the physical state of the oxidant (gas, liquid, solid), and its decomposition rate. Backhoes, trenchers, and augers have been used to work liquid and solid oxidants into contaminated soil and sludge. Liquids can be delivered either by gravity through wells and trenches, or by injection.

Pressurized injection of liquids or gases, either through the screen of a well or the probe of a direct-push rig, will force the oxidant into the formation. The direct-push rig offers a cost-effective way of delivering the oxidant. If needed, the hole can be completed as a small-diameter well for later injections. Potassium permanganate and other solid-phase chemical oxidants have also been added by hydraulic or pneumatic fracturing.

Oxidation technologies have the potential for achieving significant removal of subsurface contaminants; however, the results of field and laboratory work indicate complete removal of contaminants may not be achieved with these technologies even under optimal conditions. Innovators are combining the benefits of using ISCO with compatible technologies, such as solvent flushing and bioremediation, to maximize remediation potential.

Hi Ronnie & Michele,

. . . As I have told Jan and Ed numerous times, I really respect how *WWDR* operates - great publication, great people, and you don't inundate us with e-mails like some other organizations.

Thanks!

**Jeff Hoffer**

Sales Manager

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# In memory of our dear friend, Zane Earl Poppell

11/22/2018

While celebrating Thanksgiving with family at the age of 57, Zane fell ill and was being rushed to the hospital when he succumbed to an apparent heart attack. This news came as a great shock to all of us here at **WorldWide**, even though some had never had the privilege of meeting him, we saw his face many, many times through the **WWDR** photos taken at the various trade shows he covered with and for Cotev Chemical Corporation.

His smiling face lit up the room - and he would often tease and hide his face when photos were being taken. We all smiled and were sort of envious of his traveling in his camper with his dog(s) across the country to these events. It was an experience we all wished we could have had - even though it was supposed to be "work" he made it sound and look like fun. He truly loved his position with Cotev Chemical and will be sorely missed.

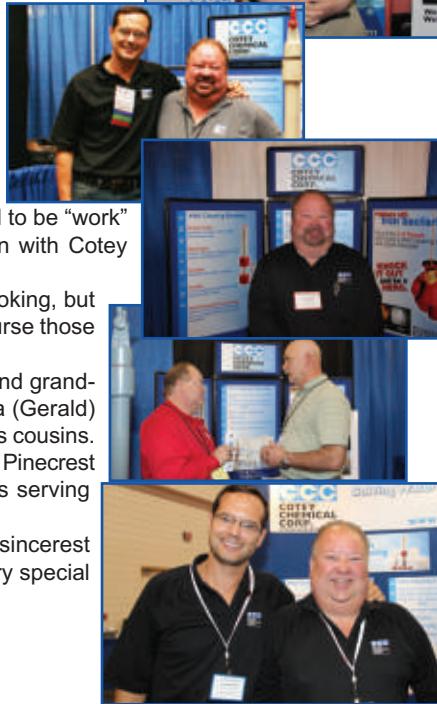
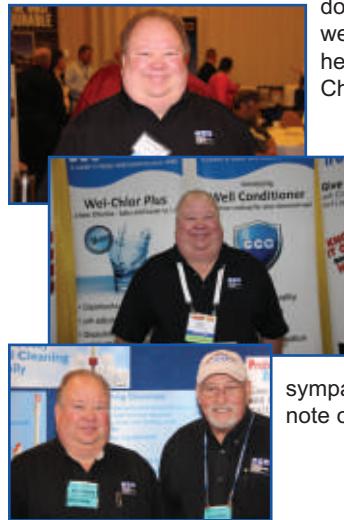
He was an outdoorsman who enjoyed motorcycling and cooking, but his favorite pastime was time spent with his family and of course those pups of his.

He is survived by his daughter Casie (Carlos) Robles and grandson Hanley; aunts and uncles Patsy (James) Carter, Sandra (Gerald) Edenfield, Betty Harris, Donnell (Pat) Brannen; and numerous cousins.

Zane was laid to rest on Sunday, November 25th, in the Pinecrest Memorial Cemetery with the help of his cousins and friends serving as pallbearers.

All of us at **WorldWide Drilling Resource®** send our sincerest sympathies to Zane's family and friends worldwide, along with a very special note of condolences to Kevin, Jerry, and Dawn at Cotev Chemical.

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## The "Idiots" Corner by "Billy Bob Smith"

I know I did a previous article on New Year's Resolutions, but is it me or is the world getting crazier and more idiotic every year?

Since we have started a new year, I thought we could kick it off with everyone's good intentions to fix things, change things, get better, be wiser, or just live with some common sense, but I'm sure if you are reading this, you don't need to change or fix anything in your life - right?

Well, let me share some of the New Year's Resolutions a few of my friends, family, and a couple of strangers shared with me. They range from pure stupid to pure outrageous. What do you think? Keep in mind, it doesn't matter what your intentions are - it's what you do with your intentions that matters, and I'm here to tell you as The Genius when it comes to idiots - the world has more of them this year than last year. Are the numbers increasing or am I just getting more cynical?

- One teenager told me that next year they were going to grow up and act more mature.
- A server in one of my favorite restaurants told me next year she was going to start being nicer to customers.
- An airport gate agent told me he was going to stop lying to customers and only tell the truth, but was afraid he might get fired as a result.
- A hotel clerk told me their resolution was to stop gossiping about guests to other guests.
- A family member told me in 2019 they were going to start paying more attention to their astrological messages.
- A neighbor said for the entire year of 2019 they were only going to eat vegetables for every meal.
- A distant relative I haven't seen in years said in 2019 they were going to do a better job of visiting family and friends even though they were confined due to health reasons.
- Okay, I can't resist this one. I was eating dinner at a restaurant (the city can remain nameless) and I overheard these newlyweds in the next booth talking about plans and goals for next year. She said, "Let's try and have a child this year." He said, "I think we should wait a few years." She then said, "We shouldn't wait too long, we are getting older every day." He reconsidered, "Okay, let's make a resolution next year to have more \_\_\_\_\_ in the \_\_\_\_\_. Sorry I had to edit this comment for reasons I'm sure you would understand if you knew what I heard. Anyway, even I was embarrassed, and trust me, I have heard it all over the years.

So, what were your resolutions for this year, and how many have you already broken? Have a great 2019!

*Billy Bob*

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

"A New Year's Resolution is only as good as the one you made last year. So, how did you do last year?" ~*Billy Bob*



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7:00 pm - 12:00 am	Exhibitor Set-Up
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**Wednesday, 20th**

6:00 am - 10:30 am	Exhibitor Set-Up
8:00 am - 5:00 pm	Education Sessions
10:30 am - 5:00 pm	Exhibition Hall Open
5:00 pm - 6:00 pm	Cash Bar
6:30 pm - 10:00 pm	Dinner Banquet, Silent Auction, and Celeste Kellogg Concert

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**Thursday, 21st**

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9:00 am - 5:00 pm	Educational Sessions
2:00 pm - 7:00 pm	Exhibitor Teardown

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some type of neuromuscular sensation as I crossed over the area. The problem was, the path of whatever I was sensing was only about 20 feet from the 420-foot dry hole. When I subsequently marked the site, the property owner said, "Jim, there's no way this well [drilling contractor] is going to drill right next to this 420-foot dry hole!" I told him if I were a well drilling professional, I probably wouldn't even think about drilling so close to a dry hole either, but I didn't know what else to tell him, because for what it was worth, the path on the surface was the only thing I could sense on the entire property. I didn't tell him I was on his property "only under protest", because my dear mother had "demanded" I try to help a relative!

There's much more to this story, but the well drilling contractor returned two days later and drilled on my selected site. The well was 40 feet deep, and produced 50 gallons a minute! If my arms would have been twice as long, I could have reached both of the borings! Most any skeptic would say it was just dumb luck. If that's what it was, so be it, but I'll have to admit I've had many hundreds of similar "dumb luck" experiences since that time.

*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**.*

**Jim**

Jim Kuebelbeck may be contacted via e-mail to [michele@worldwidewellresource.com](mailto:michele@worldwidewellresource.com)

EXB

## Through the Back Door!

by Jim Kuebelbeck

### Lesson

In life, one learns some things by intent, and other things quite by accident. The same can be said about the unusual human faculty of being able to sense underground water sources by what is known as "water dowsing". Some 50 years ago, when to my utter disbelief, I first discovered the practice of water dowsing was in fact a credible human ability in certain individuals, and subsequently discovered I was also able to sense underground water flows, it was to me "much like a sly fox being eaten by the chickens." Even after this, early on, I decided there was no way I myself was ever going to consider offering advice to anyone about the presence of an underground water source based solely upon some kind of dowsing reaction with an instrument of some sort! I was not about to tell anyone where to spend more of their hard-earned money in a search for a satisfactory groundwater supply.



*Have you noticed all the instruments searching for intelligent life are pointing away from earth?*

This decision came to an abrupt halt some years later when my mother called one day and told me I "was" going to help a family relative locate a water source for a new home they were building. They had just drilled a 420-foot dry hole and didn't know what to do, because the house was already being built. I told my mother no way was I going to tell anyone where to drill a well, because if I failed, I'd not only look like a fool, but she would also, because she had suggested I do this! "Jim," she said. "You 'are' going to do this, because I promised them you would. You know you can do this." She hadn't spoken to me quite like that since I was a kid, and after a rather lengthy conversation regarding my refusal to at least help a relative, I reluctantly agreed to try to help them with the dowsing method I had "supposedly" learned.

When I arrived at the property, the drilling rig was still set up over the 420-foot borehole. I took the liberty of dropping a small pebble down the hole. It took about ten seconds for it to clink at the bottom of the totally dry hole. Using my unproven dowsing method, I found only one path on the surface where I seemed to sense

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Jan / Ronnie,

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*Allan Shauby*

VP Sales & Marketing  
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## The Un-Comfort Zone II

by Robert Evans Wilson, Jr.

### Why Innovate?

In the late 1970s, my mother was working at a children's hospital. She came home every day and shared stories of the kids she worked with. One night, my sister dreamed the children in the hospital were playing with dolls who were sick or injured. The dolls were like them - with bandages and casts, surgery scars, and intravenous (IV) tubes in their arms. Dolls

that had to use crutches or a wheelchair. She told my mother about it. Mom saw it as a great idea. She envisioned dolls with a variety of health challenges her patients at the hospital could relate to. She thought the dolls would help children with illnesses and disabilities feel better about their condition - to be able to play with dolls that looked like them. Dolls that were not perfect. Mom also thought it might be a way our family could make some money after my father lost his construction business.

My mother took the idea very seriously and hired artists to create drawings of the various dolls. She consulted patent attorneys, manufacturers, marketing experts, and public relations agencies. Her concept was to initially go to market with a girl doll and a boy doll that would each have common surgery scars with stitches. They would come with VELCRO® bandages, snap-on casts, eye patch, crutches, wheelchair, and IV bottle with pole as accessories. Eventually, she produced a detailed proposal for a line of disabled dolls. She presented it to every doll maker and toy company in the United States. To her disappointment, they all turned her down. None of them thought there was enough of a market for them to make a profit. She was simply ahead of her time, because today - 40 years later - there are several manufacturers of disabled dolls.

I have mentioned before in this column there are three times we are most likely to be innovative: by necessity, out of curiosity, and to make money. Making money is the most intentional way in which people innovate. If you want to make money with innovation, you need to solve a problem a lot of people have. You've heard the famous proverb, "Build a better mousetrap, and the world will beat a path to your door." It's true, but you need to find a problem you can solve.

In my speeches and workshops on creative-thinking and innovation, I offer some suggestions to my audiences on how to find a good problem to solve. I ask them to think about all the tasks they do every day whether it is at work or home. I then say, "I'll bet there is at least one of those tasks that you hate to do." This typically gets a quick response as several people will blurt out some job or chore they detest. I then suggest that if they hate doing the thing, then there are probably countless other people who hate it as well, which means they have now identified a problem that needs solving - a solution which might become a million dollar idea.

I love the story of Sara Blakely, who first solved a problem for herself, and then realized it solved the same problem for many other women. In 1998, she was required to wear pantyhose as a sales representative in Florida. She liked control-top pantyhose for how they eliminated panty lines when wearing pants and made her body appear firmer, but she didn't care for the appearance of the seamed foot when wearing open-toed shoes. She also didn't like how warm they made her feel. Then one day while getting ready for a party, she got the idea to simply cut the feet off with a pair of scissors. It worked. The bottom of the hose rode up her legs, but she got the look she wanted. I would've suggested duct tape for holding the bottoms down, but Sara is smarter than me; she found a real solution, then created the multibillion dollar company SPANX®.

If you want to make money - innovate - find a problem and solve it. Find something no one has solved before, or solve it better than it has been done in the past.

There are other ways to innovate - you can look for ways to improve your existing business to make it more profitable. Maybe it's a better way to market your product or service. Perhaps a new use for an old product. You might find a more cost-effective method of production. The greater your determination, the more likely you are to succeed. Go for it!



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*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@worldwidewelldrillingresource.com](mailto:michele@worldwidewelldrillingresource.com)

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# Akira Geothermal Continues Exploration in Kenya

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

GEO

Providing reliable and affordable electric energy is important for the social and economic development of any country. In Kenya, electricity is at the core of Vision 2030 - a development plan, seeking to guide the country toward being a mid-income economy. For Vision 2030 to work, Kenya needs to generate more than 10,000 megawatts (MWs), and a minimum of 5000 MWs are expected to come from geothermal resources. Kenya's geothermal potential is in excess of 7000 MWs, spread across more than 14 locations. This opens new investment opportunities, including exploration for steam, supply of equipment, and construction of power plants.



Photos courtesy of  
Akira Geothermal Limited.

Akira One is Akira Geothermal Limited's first geothermal exploration and power plant development project. It is located just south of the Greater Olkaria Geothermal Complex in Naivasha, Kenya. The region is well developed, with a proven geothermal field. The company's goal is to commence production drilling and power plant construction for the first 70-MW phase in early 2020 and achieve commercial operation in early 2022. Once phase one is complete, the company anticipates it would simultaneously start the exploratory studies and drilling for the second 70-MW phase, aiming to complete it by 2024.

In geothermal drilling, there are various stages of well drilling, exploration, and production. During the exploration phase, the objective is to identify resource patterns to aid in production drilling. For this reason, multiple exploration wells are drilled. In 2015, the company completed drilling two exploration wells and proved the existence of the geothermal resource. However, these wells did not meet overall expectations, so the project will resume drilling with three new exploration wells. If these wells do not lead to productive discharge, the company could ramp up its exploration activities and drill even more wells.

Some of these exploration wells will be utilized as reinjection wells. Reinjection wells are an integral part of all modern, sustainable, and environmentally-friendly geothermal projects. They are a means of efficient wastewater disposal and provide additional recharge to geothermal systems. To determine what each well will be used for can only be assessed after a few wells have been drilled.



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MIN

## Epiroc Invests in Autonomous Technology

*Adapted from a Press Release by Epiroc Drilling Solutions, LLC*

Epiroc Drilling Solutions has acquired 34% of ASI Mining, a subsidiary of Autonomous Solutions Inc. ASI Mining, based in Mendon, Utah, owns onboard hardware and software to switch vehicles to autonomous operation, and system level software platforms to command and control autonomous fleets across various mining applications.

The solutions work with various mobile mining equipment, regardless of make or model, and are used by mining customers around the world.

"We believe in the ASI Mining vision and the benefits they can bring to the mining community," said Jose Manuel Sanchez, president of drilling solutions at Epiroc. "We're excited about the potential that can be realized through the ASI products and Epiroc global footprint in mining."

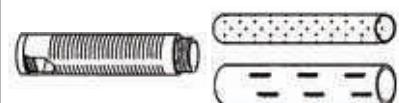


The shift to autonomous technology in the mining industry has several benefits according to Jon Torpy, vice president of marketing drilling solutions at Epiroc. "A decade ago, we started the Pit Viper automation program that has now led to a paradigm change in how drilling is done in surface mining. We see that the ASI Mining solutions will also fundamentally change the industry toward higher productivity and improved safety. We are excited about the potential that exists when we work together to bring new solutions to the mining community," he explained.



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## Achieving Better Success Rates!

*Adapted from Information by Capital Drilling*

DIR

Capital Drilling had a 35% improvement in hole success rate, which reduced costs in some areas for their client. A directional drilling project, based in eastern Europe, had a difficult time penetrating the surface prior to Capital's commencement. This contributed to holes not reaching client requirements and only a 50% hole success rate on the directional targets.

The company significantly improved results by imple-

menting a number of measures. They improved equipment capability, invested in the latest consumables technologies, employed world-renowned drilling professionals, and provided best practice training to local drill crews. Specialized equipment and larger drill rigs were imported from around the world to ensure the crews reached the deep directional targets.

Centrifugal pumps were also used to recycle drilling muds. This significantly reduced the usage of muds and water at the site, delivering real savings to the client. Cementing processes and mud programs were formulated for the difficult conditions, reducing downhole failures.

Production rates increased, achieving greater than 90 feet per day on several machines at depths of 5900-7200 feet. On an even deeper hole, the required total depth was reached 11 days earlier than expected, and progress exceeded client expectations by over ten feet per day.

Improved hole stability reduced hole abandonment and enabled two of the deepest holes to be completed to depths greater than 7400 feet, with capacity to continue drilling. By improving hole success rates, specified targets required to meet stringent ore body definition criteria were achieved where they were previously unattainable.



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**Dave Otta**

Foundex Explorations Ltd.  
Abbotsford, BC, Canada

The Sonke 2 borehole did not reach the depth of the Kola borehole in northwestern Russia, which remains the deepest in the world at 40,300 feet; however, the Sonke 2 borehole is the first borehole in the world to go through the continental layer of strata from the earth's cretaceous period. The borehole reached a depth of over 23,000 feet.

The Sonke 2 borehole is located in the Songliao Basin, one of the largest continental sedimentary basins in the world. The basin holds China's most important reserves of oil and natural gas. Wang Chengshan, the chief scientist on the project from the Chinese Academy of Sciences said, "In the 21st century, we have to face new challenges of survival and development, as well as huge challenges of resource scarcity, environmental change, and frequent disasters. Therefore, we must go further into the deep earth, which has become the consensus of all the scientists in the world."

Important scientific papers are expected to emerge from the project, including descriptions of past climate change due to volcanism and a physical impact at the cretaceous-tertiary boundary, making Songliao an even more important site for China. Cheng Qiuming, secretary-general of the International Union of Geological Sciences said, "The success of the project will provide key technologies and equipment for exploration and experimental research deep within the earth. It will also open a new space for clean energy prospecting in Songliao Basin."

## China Completes Drilling of Deep Borehole

ENV

*Adapted from Information by the China Geological Survey*

In 2014, the China Geological Survey, along with about 20 organizations, including the Institute of Exploration Technology, SinoProbe Center, China University of Geosciences, Jilin University, and Daqing Oilfield Co. began the Songke 2 project in Anda, Heilongjiang Province, China. The project has now been completed, with the drilling of the deepest borehole for scientific purposes by Asians.



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## Drilling Into Money Not Boring

by Mark E. Battersby

### Losses, We've Got Losses - and Tax Deductions

As the threat of severe winter storms replaces last summer's natural disasters, many within the drilling industry are discovering the Tax Cuts and Jobs Act repealed the tax deduction for personal casualty losses, except for losses in federally declared disasters. Fortunately, the tax deduction for business-related losses continues to provide some relief.

That's right, the deduction for an individual's personal casualty loss of property not connected with (1) a trade or business, or (2) a transaction entered into for profit after December 31, 2017, and before January 1, 2026, has been eliminated. Today, a personal casualty loss may only be deducted (1) to the extent of personal casualty gains, or (2) where the property loss was attributable to a "qualified disaster loss," i.e. one attributable to a "federally declared disaster."

Any drilling operation or business suffering a loss from a natural disaster, theft, or other casualty may be eligible for a tax deduction to help lessen the loss's impact. While casualty losses must usually be deducted in the year in which the loss event occurred, to help cushion losses suffered by drilling businesses, the tax laws contain special rules for disaster losses in an area subsequently determined by the President of the United States to warrant federal assistance.

#### For those losses, the drilling business has the option of:

- Deducting the loss on the tax return for the year in which the loss occurred, or
- Choosing to deduct the loss on the tax return for the preceding tax year.

In other words, a drilling business has the option of deciding whether their loss would be most beneficial to offset the current year's tax bill or better used to reduce the previous year's tax bill - generating a refund of previously paid taxes.

To accomplish this, the drilling operation simply files an amended tax return for the preceding year, figuring the loss and the change in taxes exactly as if the loss actually occurred in the preceding year. While this choice must be made by the due date (not including extensions) for the tax return of the year the loss actually occurred, the resulting refund can go a long way to helping the damaged business.

Unfortunately, recoveries via tax law are not always smooth, often requiring professional assistance or, at the very least, an understanding of how the tax rules work. Will your recovery include a reduced tax bill?

*Mark*

Mark E. Battersby may be contacted  
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**Longest Railway Tunnel in East Africa**

Compiled by Caleb Whitaker, Associate Editor

WorldWide Drilling Resource®

EXB

The Ngong tunnel in Kenya is part of the Standard Gauge Railway (SGR), which is under construction from the Kenyan capital of Nairobi to the town of Naivasha. China Communications Construction Company (CCCC) drilled a nearly three-mile-long tunnel in Ngong, Kajiado County, which has been designed as a single-track railway tunnel with a clearance height of about 30 feet and a width of over 20 feet. The tunnel became the longest railway tunnel in East Africa



*Photos courtesy of China Communications Construction Company.*

and second longest in Africa. CCCC engineers used the New Austrian Tunneling Method (NATM) of drilling and blasting to build the tunnel. This was the first time the method had been used on such a large scale in Kenya.

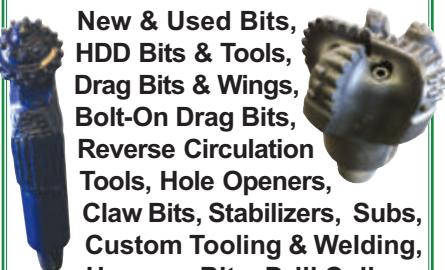
In the world of tunneling, the NATM is widely seen as a series of principles which allow for a more dynamic assessment of the terrain. Some prefer to use names such as Sequential Excavation Method or Shotcrete Method to describe the process. Unlike classical methods, such as the Belgian or German approaches where the tunnel is immediately supported without allowing it to deform naturally, NATM allows the deformation of the rock mass before stabilizing the tunnel. This reduces the amount of additional support materials required. The resulting tunnel is covered with a layer of sprayed concrete or shotcrete, which is faster and easier to execute. The shotcrete layer increases the internal cohesion of the rock mass, reinforcing the support ring, and can act as a temporary or final lining, depending on the site's requirements.

The method works by mixing construction with settling-in periods. During settling-in periods, rock mass is observed, allowing the tunnel support design to be adapted based on the geological requirements. The method is economical, efficient, controls surface collapse effectively, and enhances the working environment during construction.

For the Ngong tunnel, it took two years for 600 workers and engineers to complete the tunnel, battling water leaks and uneven pressure, while taking care to protect an oil pipeline. The tunnel was constructed using the three-bench seven-step excavation method. Blasting was used to create the tunnel's arch shape.

Among the tunnel's features are 146 refuge holes for maintenance workers to shelter in when trains approach. An emergency rescue channel was also built within the tunnel, to allow for vehicle access in case of emergencies. Six jet fans will be installed to ensure ventilation once the tunnel is operational.

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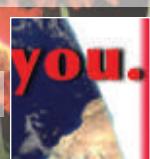
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# Ohio Study Finds No Methane Contamination from Gas and Oil Drilling

*Adapted from Information by the University of Cincinnati*

Since 2012, geologists with the University of Cincinnati (UC) have been studying the drinking water in three counties in Northeast Ohio to see if increased natural gas drilling is leading to methane contaminating private water wells.



*UC students Jacob Deighton and Laurie Heldman, pose with UC Geology Professor Amy Townsend-Small.*

area. They were also unable to find higher methane levels in close proximity to shale drilling.

"Some people had elevated concentrations of methane in their groundwater, but the isotopic composition showed it wasn't from natural gas," said Amy Townsend-Small, associate professor of geology in UC's McMicken College of Arts and Sciences. "What we found is in most cases it was probably from underground coal in the area or biological methane produced in groundwater."

Using gas chromatography, isotope ratio mass spectrometry, and radiocarbon dating, researchers were able to identify the chemical composition of the water

which helps identify whether the source of methane is from: natural gas extraction, organic decomposition, or the digestive systems of nearby cows.

When UC first launched its methane study, Ohio had 115 drilling permits in the region. By the end of the study in 2015, nearly 1600 permits had been issued. Initially, researchers believed methane concentrations in the water wells they sampled would increase with the growth of natural gas drilling in the area. However, that's not what UC's water tests revealed. The study concluded the methane detected in groundwater was "biogenic," or naturally occurring, and independent of natural gas drilling.

Carroll County Commissioner Robert Wirkner said the findings were good news. Like many of his neighbors, he gets drinking water at his house from a private well on his property. Wirkner said gas companies test the drinking water of nearby homes before and after they drill a well to observe any changes in water quality. "My water has been tested multiple times," he said. "So we're happy to hear the findings."



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## Tales from the Field

by Jeremy C. Wire  
Geoconsultants, Inc.



### Drilling Ahead with Steam and Strong Coffee

The "steam age" had long since passed, but many decades ago, I worked for an oil company in southwest Louisiana, which was still operating at least one rig that was powered entirely by steam and occasionally hired a drilling contractor. The owner of this operation, although a professional contractor, was also a "wildcatter", a type of independent individual who, even then was becoming part of a bygone era in the oil fields.

To begin the drilling process, the first activity was to build a board road into the location so the equipment, including the boilers, would not sink into the soft ground during move-in. Additional planks were placed together around the rig to form a stable working surface. The second operation was to drill a shallow water well. Although surface water was usually plentiful from a nearby bayou, shallow groundwater was the preferred filtered source for boiler feed. Once the drilling machinery was rigged up, drilling commenced.

With several boilers employed, the steam rig had suitable horsepower and torque to drill some relatively deep wells for that era. In addition, a steam source was handy for such tasks as cleaning oily work clothes, heating the "doghouse", and drying the drill cuttings from the ditch. It was my task from time to time to arrive at the rig to collect the drill cuttings so other geologists could identify microfossils in them and thereby determine what part of the geologic column we were drilling in. The drill crew carefully placed the cuttings in small cloth bags which were tied together in bunches, like bananas, and hung by one of the boilers to dry. In this manner, they were already dried and ready for examination. In retrospect, however, what I remember most from this operation is the one-gallon coffee pot placed close to one of the boilers to keep the coffee hot and available around the clock. The coffee was very strong to begin with and contained chicory for additional strength as was the custom in the region (and still is, as far as I know).

The first time I arrived at the rig, being the "new kid on the block" so to speak, the crew offered coffee from this pot, and of course this show of hospitality couldn't be refused. I thought the coffee pot had probably been near the boiler for at least 12 hours, and most likely the coffee would be very hot and strong by that time. The crew was standing around waiting for a reaction, and by the grimace I probably made when drinking it, they got one, but all in good humor!

I soon learned when the coffee in the pot had boiled down to a tar-like consistency and was thrown out, and a fresh batch made, the crew called it as BS&W or "basic sediment and water", which is generally a component of crude oil and might be found in the bottom of oil storage tanks. Some good memories from a long-ago drilling operation, which was somewhat unique in that it was probably one of the last steam drilling rigs operating in the region at that time.

*Jeremy*

Jeremy Wire may be contacted  
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# Is 3-D Printing the Future of Equipment Manufacturing?

*Adapted from Information by the Association of Equipment Manufacturers and Oak Ridge National Laboratory*

Last year's CONEXPO-CON/AGG event featured the world's first 3-D printed excavator. So, what is the future of 3-D printing for the equipment industry? The Association of Equipment Manufacturers (AEM) was part of the team effort which developed the state-of-the-art excavator and says there are three main things to keep in mind when considering 3-D printing and its potential for equipment manufacturing.



*Photo courtesy of the Association of Equipment Manufacturers.*

**1. It has enormous potential, but it is still growing and evolving.** The consensus right now among leading additive manufacturing experts is the technology's immediate potential can be most readily found in smaller-scale deployments, according to Dr. Lonnie Love, corporate research fellow at Oak Ridge National Laboratory (ORNL).

According to Love, 3-D printing is not going to change manufacturing overnight, "It's not going to displace casting. It's not going to displace welding," he stated. One of the obstacles is 3-D printing isn't fast enough yet. "When you make these great parts at low volumes, you don't care that it takes a week or a month . . . but we've got to go faster because it drives the productivity up and the costs down."

## 2. 3-D printing can help manufacturers do things they've never done before.

There is no doubt the technology has incredible capabilities for manufacturers. Dubbed Project AME (Additive Manufactured Excavator), Love and his colleagues at ORNL used the technology to print the 3-D excavator using a variety of machines to create and assemble three components: a cab, a boom, and a heat exchanger. The boom was created using a cutting-edge free-form additive manufacturing technique to print large-scale metal components. By using different machines, materials, and processes, researchers were able to demonstrate the seamless integration of all the parts working together in one excavator. The success of the project proved the potential of 3-D printing technology is endless.

**3. This technology can help manufacturers be more efficient and save money.** The production of molds, jigs, and fixtures used in the mass production of heavy equipment typically takes months, is costly, and often involves tooling companies based overseas. The widespread adoption of additive manufacturing could change that. "This may be a mechanism to rapidly get tooling back in the U.S.," Love stated. "To make it take days and not months. It costs thousands instead of hundreds of thousands. We've already proven this on the automotive and aerospace sides. Now it's time to take a look at construction and see where it fits."

Although the equipment industry currently designs and builds machinery which is used for decades, manufacturers spend a great deal of money to keep an inventory of spare parts to meet customer needs.

With 3-D printing technology, companies will be able to cut the overhead costs and warehouse space. "The advantage of this technology is you could actually print a replacement part without having to have that inventory," he said. "That, to me, has tremendous potential."

### 3-D Printed Components

#### STICK

The 7-foot long, 400-pound stick was printed entirely of low-cost steel on the Wolf Pack printer in only five days. This is the first application of large-scale metals additive manufacturing at ORNL.

#### CAB

Using the Cincinnati Incorporated Big Area Additive Manufacturing system, the cab was printed in only five hours with carbon fiber reinforced ABS plastic.

#### HEAT EXCHANGER

The 13-pound aluminum heat exchanger was 3-D printed entirely on the Concept Laser X-line 1000 powder bed machine.

*Diagram courtesy of Oak Ridge National Laboratory.*

## Open the Doorway to all the Event Photos during PBIOS 2018.



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Ad Copy:

**February 1<sup>st</sup>**

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# water for life

WTR

by Tim Rasmussen

October 19, 2018, dawned clear, bright, and cool. The temperature was really warm for the time of year in Spokane, Washington. This was the day Water For Life loaded the container for shipment to Guatemala. There had been a slight mix-up as to the date, but volunteers were ready on the Friday morning. The truck driver had been instructed to go to Lincoln Boulevard in the valley, but he got in contact with us and we corrected the instructions to come to Lincoln Road. He arrived about 10:15 a.m.

Without any delay, the workers began loading pallets of materials for shipment. Over the years, we have gotten better about having things packed in pallets and staged for the loading. All went smoothly. There were no glitches or problems. Rod Bartholomew operated the forklift, and several men inside the container with a pallet jack made fairly quick work of the first part of the loading.

Our driver this year, Terry Ottman of Moses Lake, Washington, was interested in what we are doing, and I talked to him a while about our project, giving him some details and insight into the varied mix of material being placed in the container. He was happy to be helping to do something for folks who do not have access to clean water. Being able to converse with the driver was a treat for us. Often, the drivers are from other countries and speak very little, if any English. Also, we have had concerns about the driver's ability to drive as we have watched them try repeatedly to position the truck at the loading dock or the gate to the shop. Not this year. Terry was obviously very skilled with the truck and had no issue following our directions, placing the trailer precisely where we needed it to be.

The loading took about three hours. The shipping company allows two hours, but three hours is about the usual time it takes. Handling the casing pipe and thousands of feet of galvanized and plastic pipe took a little while because each pipe needed to be handled by hand and placed securely in the container.

Finally, all was complete, the doors closed, and the seal attached. Terry was confident he could make it to the dock in Seattle by Saturday, and we would not miss the in-gate deadline for making the ship. The Mediterranean Shipping Company's vessel, MSC ANZU, was at that moment heading for the Oakland, California, harbor for loading containers bound for Seattle.

There was plenty of time, but there was also time for things to go wrong. Ships get delayed. Trucks can be delayed. Things happen. Once the cargo is out of our hands, issues can occur which can throw our plans completely askew.

We trust the Good Lord as our shipping agent, and we all bowed our heads and sent up a prayer for safety for Terry and our precious cargo, bound for the highland jungle of Guatemala. Thank you to all our donors and friends.

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

*Tim*

Tim Rasmussen may be contacted via  
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## California Natural Gas Pipeline Receives Upgrades

DIR

Adapted from Information by Southern California Gas Co.

In Southern California, more than 90% of residents use natural gas for heating, hot water, cooking, drying clothes, or other uses. In addition, about 60% of all electricity generated in California is produced using clean-burning natural gas. Investment in the community's natural gas infrastructure is important to ensure residents and businesses receive safe reliable natural gas service.

Southern California Gas Co. (SoCalGas) safely completed a five-year, \$100 million project to modernize three high-pressure natural gas pipelines, which will enhance safety and reliability for nearly 375,000 residential and commercial natural gas customers in the L.A. Gateway area. As part of the project, more than 13 miles of large transmission pipelines were tested and replaced with state-of-the-art steel piping. The project also involved

*California Natural cont'd on page 46.*

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

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The Mountain States Groundwater Expo, hosted by the Arizona, Colorado, Nevada, New Mexico, and Utah groundwater and water well associations, is held each year at the Aquarius Casino Resort in Laughlin, Nevada. Mark your calendar for February 7-8, 2019, to visit with manufacturers and suppliers, drilling contractors and pump installers, technical and consulting firm representatives, as well as groundwater officials.

Thursday starts with several classes, then a meet and greet in the exhibit hall, followed by the Buck Lively Scholarship Auction and Raffle. Friday has more seminars, a buffet lunch in the trade show area, then more education opportunities in the afternoon. Saturday is reserved for a Board Meeting.

Register to attend at [www.mountainstatesgroundwater.com](http://www.mountainstatesgroundwater.com)

Celebrate 70 years of the Virginia Water Well Association at the Fredericksburg Expo & Conference Center in Fredericksburg, Virginia. The 2019 Winter Conference is February 20-21. This new indoor venue boasts over 45,000 square feet for booths and heavy equipment displays. Also new this year is an opportunity for local schools to conduct field trips to the exhibition hall so students can see the displays and realize the industry is a viable, hands-on career.

Set with four tracks, there's something for everyone in the education classes. The conference will also feature a silent auction before, during, and after the dinner banquet on Wednesday night; and entertainment will be rising country music star Celeste Kellogg who is a daughter of the Virginia water well industry. Don't miss it!



Visit [www.vawaterwellassociation.org](http://www.vawaterwellassociation.org) for more details.



The Michigan Ground Water Association (MGWA) will hold its Annual Conference/Fundamentals on February 21-22, 2019, at the J.W. Marriott in Grand Rapids, Michigan. Highlights include combined beginner, advanced, and MGWA education tracks; McEllhiney Lecture; and annual meeting. Lunch is provided both days. There will also be tabletop displays of products and services for the industry, plus a banquet and awards.

See [www.michangroundwater.com](http://www.michangroundwater.com)

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## Precision Controlled Rock Blasting

Adapted from Information by Dykon Blasting Corp.

EXB

Explosives are a form of energy similar to gasoline and electricity. Automotive engineers design motors to use small amounts of energy to develop usable amounts of torque. Electrical engineers design power plants to generate huge amounts of energy, whereas electrical appliances are designed to use only what is required to operate them. In each case, the available energy consumed is harnessed in precisely controlled amounts which are safe and reliable when used correctly.



Photos of precision blasting at Ferguson Power Plant,  
courtesy of Dykon Blasting Corp.

What if this principle was applied to explosives, and used to break rock in construction areas? This is exactly the concept behind precision blasting, which is often used to chemically fragment rock in urban or congested construction areas, safely, reliably, and economically.

Small holes are drilled into the rock in a pattern, allowing the removal of a very small amount of rock from each hole. The amount of explosives needed to break the rock around the holes is calculated, ensuring only the necessary amount of explosive is placed in the holes. Each hole is detonated in a sequence, so only a fraction of the total amount of explosive is used to fire at any one time.

By controlling the firing

sequence of each hole, rock can be moved toward a hole which has already been fired. This works much like the domino principle. Imagine lining up 50 pounds of dominos on a table, then tipping one domino so all the others will fall in a controlled sequence. This will result in the energy of the falling dominos being transferred to the table in a controlled sequence and over an extended period of time. Such is the case with precision blasting.

Using a combination of precision blasting techniques and precision drilling, Dykon Blasting Corp. offers blasting services in areas where rock is encountered in urban areas, near privately owned businesses, or close to utility service lines.

In one project, extremely hard rock was encountered while excavating for the Ferguson Power Plant in Horseshoe Bay, Texas. Fluor, an engineering solutions company, exhausted conventional means of rock removal such as hoe ramming, relief hole drilling, and use of expansive grouts. The expansion project was inside an active power plant, so the project management team did not think blasting was even possible. Dykon was contacted to assess the feasibility of using blasting for the project. After visiting the site, a plan was put together to safely and efficiently blast the rock. With nearby occupied buildings, power plant, gas lines, and utilities, the project had to be designed and completed in a precise fashion. Dykon was able to safely blast all the remaining rock for the project. After completion, Fluor's superintendent made the statement, "rock blasting will no longer be our last resort it will be our first".



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# The World of Minerals

**Gold** is one of the most popular minerals, known for its value and special properties. Throughout history, almost every established culture has used

gold to symbolize power, beauty, purity, and accomplishment. Today, no other substance of the same rarity holds a more visible and prominent place in our society. Most of the natural gold specimens found have been smelted for production, so nice specimens are highly regarded, and are worth much more than the standard gold value.

Most of the gold which is newly consumed or recycled each year is used in the production of jewelry. About 10% is used in coinage or in the financial stores of governments. The rest is consumed in a wide range of other uses which include awards, pigments, gilding, and optics.

Gold is a highly efficient conductor capable of carrying tiny electrical charges. Because of this property, a small amount of gold is found in almost all electronic devices, including cell phones, televisions, global positioning units, and more.

Since 700 B.C., gold has been used in dentistry and will probably continue to be the best option for replacing broken or missing teeth. It makes for the best fillings, crowns, bridges, and orthodontic appliances because the metal is chemically inert, easy to insert, and nonallergenic. In the medical field, small amounts of gold isotopes are used in certain radiation treatments and diagnoses.



In the aerospace industry, reliable and effective technologies are key to survival, so gold plays an essential role. It is used to lubricate mechanical parts, conduct electricity, and coat the insides of space vehicles to protect people inside from infrared radiation and heat.

Gold is also used when making specialty glass for climate-controlled buildings. A small amount of gold dispersed within the glass or coated onto the glass surface reflects solar radiation outward, helping the buildings stay cool in the summer, and reflect internal heat inward, helping them stay warm in winter.

There are also some interesting lesser known facts about gold. In every cubic mile of sea water, there is 25 tons of gold, which is a total of about 10 billion tons of gold in the oceans; however, there's no known way to economically recover it. Gold can be hammered into sheets so thin a pile of them an inch high would contain more than 200,000 separate sheets. A single ounce of gold can be drawn into a wire 60 miles long.



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## How Do You Want to be Remembered?

by Tim Connor

I'm not being morbid - just asking a simple question. Trust me - the years pass much more quickly than most people realize or are willing to accept. Your chronological age is not the main determining factor as to when you will check out of here.

First, who remembers us and why depends on many factors: our relationships (family, kids, siblings), careers (customers, coworkers, bosses), where we lived (neighbors, friends, acquaintances), and yes even a few total strangers who might have crossed our paths briefly.

Then there are our actions (things done and not done), behaviors (good, bad, stupid, thoughtful, selfish, kind, egotistical, compassionate). And of course, there are our words (things said and not said, kind words or hurtful words, etc.).

How about our beliefs, attitudes, prejudices, and opinions (did we always have to be right or could we accept mistakes; were we always talking, or did we ever listen and care; could we disagree without anger or validate others for who they were.)

Yes, there's one more - our goals, desires, dreams, and plans. Did we include others or exclude them; did we rely on others or did we always go it alone; did we give credit when it was due or always keep it for ourselves; did we share our victories or assume we deserved all the benefits regardless of other guidance?

Okay, I hope I have made my point - there are numerous factors regarding who will or will not remember us, why they will or will not remember us, and how they will remember us.

As I go through my last life chapter, I have spent a lot of time considering this question and if it is too late to change what those who were in my life - for many years or even a few minutes - will remember about me or even care. Ever wonder how many people will attend your funeral? Full house or a lot of empty seats? You've heard it I'm sure - it's never too late to make a new first impression. Does this rule also apply - It's never too late to change your legacy? I don't have a clue, but what I do know is how you live your life while you are here becomes the guideline for your legacy or how, why, if, when you will be remembered. I'm not referring to all those famous folks. I'm talking about us normal folks who are doing our best to live a life of dignity, happiness, success, compassion, and love - rather than fame and fortune.

So, here's a thought - make a list of all the people in your life who matter - current or past, relatives or friends - anyone or everyone. Now write down the words you think each one of them might use to describe you, your legacy, or what you meant to them while you shared life with them if they were giving your eulogy. Got the courage to do this? If no, why not? If yes, go for it.

And here's a final thought - if you can handle it. Now share the words, memories, etc. you wrote down with as many of these folks as you can - and ask them for their response (agree, disagree, like, don't like, etc.).

In His service,

*Tim*

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Happy New Year from all of us here at **WWDR**.

The **WWDR** office will be closed January 1st,  
so our staff can enjoy time with their families;  
e-mail will be monitored.

## Constructing a Water Well

*Adapted from Information by the University of California*

The process of designing and constructing a water well begins when arrangements are made with a licensed drilling professional or consultant who will design the well and oversee the work of the drilling professional. After a suitable location is established, the drilling rig is set up.

In California, the most common drilling techniques are rotary, reverse rotary, air rotary, and cable tool. For shallow wells which are not supply wells, auger drilling is often used. In unconsolidated and semiconsolidated materials, rotary, reverse rotary, and cable tool methods are commonly employed. Cable tool drilling generally is less labor-intensive, but it takes more time than reverse rotary or rotary drilling. Reverse rotary and rotary drilling requires large amounts of circulation water and the construction of a mud pit, which must be considered if the well is to be drilled in a remote location with no access to water. Hardrock wells are generally drilled with air rotary drilling equipment. Properly implemented, all of these drilling methods will produce equally efficient and productive wells where groundwater is available.

Sometimes a small-diameter pilot hole will be drilled before the wellbore. From information obtained from the pilot hole, aquifer formations and groundwater quality at various depths can be determined, then the final well design can be optimized for the specific hydrogeological conditions at the site.

During drilling, a detailed log of the drill cuttings from the advancing borehole must be kept. In addition, after drilling has been completed, but before the well is installed, it is often desirable to obtain more detailed data on the subsurface geology. This can be done by taking geophysical measurements in the borehole. Specialized equipment is used to measure the electrical resistance, as well as the self-potential or spontaneous potential of the geological material along the open borehole wall.

The two most important factors which influence these specialized logs are the texture of the formation and the salinity of the groundwater. Sand has a higher resistance than clay, while high salinity reduces the electrical resistance of the geological formation. Careful, professional interpretations of the resistance, spontaneous potential logs, and descriptions of drill cuttings provide valuable information about water salinity, location, and thickness of the aquifer layers. The information obtained is extremely useful when finalizing the well design, which includes a determination of the depth of the well screens, as well as the size of the screen openings and gravel pack material.

Once the wellbore is drilled, well casing and well screens are installed, then the annulus around the casing is filled with a gravel filter pack and the appropriate cement and bentonite seal. This prevents water from leaking between uncontaminated and contaminated aquifers, as well as from the surface into the well. Next, the drilling professional develops the well, implements an aquifer test, completes the sanitary seal of the wellhead, and installs a pump and power source. Proper design, construction, development, and completion of the well will result in a long life for the well and efficient well operation.



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### Odd Facts

It takes 75,000 crocus flowers to produce one pound of saffron, which is why it is the most expensive spice in the world.

All of earth's continents are wider at the north than the south.

The spots of light you see when you rub your eyes are called phosphenes.

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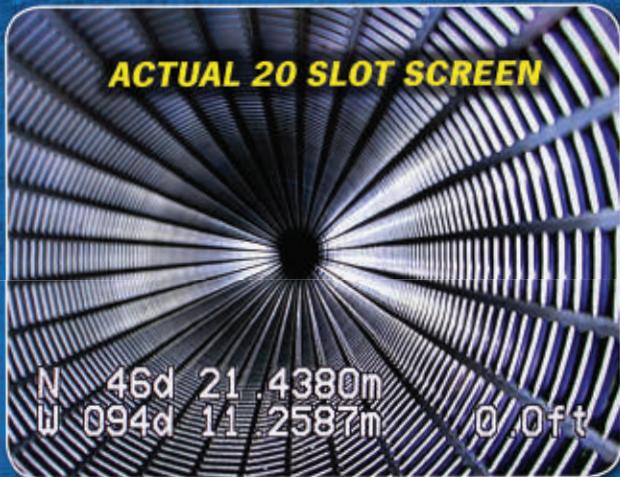
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## Seabees Assist with Exploration Drilling in Colombia

*Adapted from Information by the U.S. Navy Public Affairs Support Element*

The rural community of Riohacha, Colombia, has been suffering through drought conditions for nearly a decade. Recently, a team of U.S. Navy construction professionals assigned to Naval Mobile Construction Battalion 133 (NMCB-133) began water well drilling exploration operations in the area as part of the Southern Partnership Station (SPS) 2018. The SPS is an annual series of U.S. Navy deployments which focuses on working with regional partner nation militaries and security forces.

In an effort to increase the community's supply of fresh water, NMCB-133 will work side-by-side with members of the Wayuu population who are indigenous to the Colombian town located in the country's La Guajira Department.

"This community has been in a state of drought for the last 8 to 10 years, but in the last 2 or 3 years, it has been much worse," said Brunilda Morales, a linguist and instructor of languages for Wayuu, from La Guajira's Office of Indigenous Affairs. "This prolonged dry season is effecting our well-being. Water is everything to us. Plants, animals, and people continue to live through water."

Although the probability of finding fresh, usable water in the selected drilling site is high, the project is still labeled an exploration mission until water is actually located. To improve the project's chances of locating water, SPS and NMCB-133 decided to bring in an on-site geologist to conduct scientific studies of the drilling area. The geologist and drill operator will work together to come up with the best design solution for the project.

Dr. Kimo Zaiger from Naval Facilities Engineering and Expeditionary Warfare Center is currently working at the drill site with Seabees from NMCB-133. He said, while drill operators are technical experts in their field, geologists work with them to bring a scientific level of expertise to their craft. Geologists are more knowledgeable in how the earth is structured, and can help interpret changes in the stratigraphy and rock mechanics.

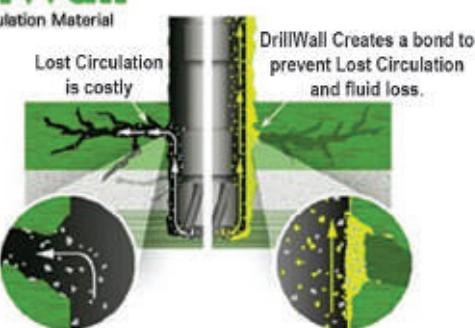
The water well drilling and exploration operations in Riohacha provide a benefit to people of the La Guajira Department, and also to the Sailors conducting the drilling. "Efforts like this one allows us to grow our relationship with partner nations," said Lieutenant Commander George Roth, team lead for the SPS Ground Command Element. "These efforts also give our Sailors the opportunity to practice their skills in a real-world scenario vice in a training environment. If successful, we will have assisted in providing water for a region and its people."



**U.S. Navy Construction Mechanic 2nd Mechanic Brady Mangels with NMCB-133, marks drill steel per foot during water well drilling exploration operations in Riohacha, Colombia. U.S. Army photo by Staff Sergeant Kalie Frantz.**



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## Hemp Solves Lost Circulation with the Environment in Mind

Adapted from Information by Hemp, Inc.

A serious problem when drilling a gas or oil well is lost circulation, which occurs when drilling fluid flows into one or more geological formations instead of returning up the annulus. Lost Circulation Materials (LCMs) are the substances added to drilling fluids when drilling fluids are being lost to the formations downhole. Some of the commonly used LCMs are fibrous (tree bark, shredded cane stalks, mineral fibers, and animal hair), flaky (mica flakes, pieces of plastic, and cellophane sheeting), and granular (ground and sized limestone, carbonates, marble, wood, nut hulls, formica, corncobs, and cotton seed hulls). Most drilling fluid engineers have an LCM formula which uses a mixture of several materials, even for drilling through rock formations with very few holes, cracks, or porous areas, which results in less fluid loss.

Hemp, Inc.'s mission is to provide green solutions which help make the world a better place to live. Hemp products are environmentally friendly, healthy, and can often replace petroleum-based products. The DrillWall™ Lost Circulation Material product works faster to plug the leaks, and is cost competitive with most LCM materials. The drilling fluid additive is insoluble in water, nontoxic, and biodegradable. It acts as a borehole stabilizer and a lubricating agent, while also preventing differential sticking. The product is a mixture of micronized organic cellulose fibers, providing excellent seepage and loss circulation control.

DrillWall™ has been field-proven for all types of drilling fluid formulas including water-based, oil-based, synthetic-based, and constant rheology fluids. It has been used in all types of high-loss geology formations including sand, fractured shale, presalt, pea gravel, and other highly porous formations. It can be mixed through the mud hopper or directly into the mud tank at the agitation point. It has also been tested and used by many of the world's largest gas and oil companies, including Chevron, Aramco, Petrobras, Ultra Petroleum, and others.

In a forward-thinking move, Hemp, Inc.'s wholly-owned subsidiary Industrial Hemp Manufacturing, LLC purchased the largest decortication (process of removing the outer covering of a seed or fiber) plant in North America. They have begun the task of moving operations to Spring Hope, North Carolina, where their 70,000-square-foot warehouse is located. When the plant is operational, it will start producing fiber for products. The first products to be produced will be LCMs and oil absorbents from kenaf (a close relative to cotton and okra). Later, the products will be produced from industrial hemp.

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# Promising Drilling Results for the GEothermie 2020 Program

*Adapted from Information by GEothermie 2020*

The first drilling results for the GEothermie 2020 program in Geneva, Switzerland, confirmed the forecasts made during the exploration phase. The target depth of 2130 feet was reached, and drilling actually descended further to 2440 feet to collect more information. At this extended depth, hot water was encountered. This water rises naturally under pressure to the surface at a temperature of 91°F (33°C) and a flow rate of more than 13 gallons per second.

The GEothermie 2020 program is led by the State of Geneva and implemented by Services Industriels de Genève (SIG). The first objective of the program is to confirm the theoretical data collected during seismic surveys. The team was attempting to verify the targeted geological layers and faults were present at the location where the model had indicated, as well as confirm the water circulates at viable temperatures and flows for geothermal production. For this first objective, the results of the drilling program exceeded all expectations in terms of temperature and flow.

"These first results are promising, and will enable the Canton of Geneva to achieve its energy transition, including renewable thermal," said Antonio Hodgers, state councilor for the Department of Territory. "We aim to cover 20% of the Canton's heat needs by 2035 with geothermal energy."

The second objective of the drilling program is to create a geothermal center of excellence in Geneva. The medium-depth drilling program has helped develop the skills of SIG, the University of Geneva, and regional companies active in geothermal energy. Christian Brunier, general manager of SIG said, "This drilling went very well and gives very encouraging results. This is a success because it exceeds our expectations. Then, it improves our technical and organizational knowledge in medium-depth geothermal energy. The results collected will be studied for several months in order to specify the conditions under which geothermal energy will be exploited in Geneva."

The final objective of the program is for the drilling to serve as a reference base for the State of Geneva as it aims for a sustainable and controlled development of geothermal energy. This will help to establish regulations which will accompany the law on underground resources. Based on the results of the program, the GEothermie 2020 is continuing its field operations with new seismic campaigns scheduled for this year and 2019.

## Recipe Corner

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

### Spicy Potato Soup

1 Pound of Hamburger  
3 8-Ounce Cans of Tomato Sauce  
1 Small Onion, Chopped  
4 Cups of Cubed, Peeled Potatoes  
4 Cups of Water  
1/2-1 Tablespoon of Hot Pepper Sauce

In a Dutch oven or large kettle, brown beef and drain.

Add potatoes, onions, and tomato sauce. Stir in water, salt, pepper, and hot sauce. Bring to boil.

Reduce heat and simmer for 1 hour or until potatoes are tender and soup has thickened. Makes about 6-8 servings, or 2 quarts.

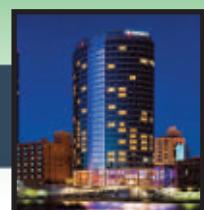
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# More Exploration Drilling Coming to the Philippines

Adapted from Information by Philippines Information Agency

GEO

The Kalinga Geothermal Project in the Philippines has been given a two-year extension for its exploration permit. It is now on Phase 3 which is exploration drilling, including a memorandum of agreement signing and declaration of the project's commerciality. The geothermal project's estimated capacity is 100 megawatts (MWs) with a service contract of over 160 square miles. Contracts are in place with First Balfour as general contractor and Drill Corp. for drilling. Community development projects in four of eight ancestral domains have also been completed.



*Ed Sevilla, consultant of Kalinga Geothermal project, moderates the discussions during a meeting with government stakeholders.*

The Philippines' Department of Energy granted the project a Certificate of Energy Project of National Significance (CEPNS). The project is one of only four applicants issued with the CEPNS from 23 applicants which were accepted out of 306 applications filed.

The project is a consortium of Aragorn Power and Energy Corporation, Guidance Management Corporation, and Allfirst Kalinga Ltd. During a meeting with government stakeholders, the consortium representatives said they will continue to engage affected communities and other stakeholders. Plans are also in place to construct access roads to the project site and well pads for the targeted well testing in the second quarter of 2019.

Vice Governor James Edduba has been pushing for the project to materialize since he was the local chief executive of Pasil. Now he is with the provincial local government units, and has assured the project of the necessary assistance. Governor Jocel Baac likewise called on affected communities to set aside personal benefits and consider long-term benefits.

Generation of clean and cheap energy from renewable energy sources is an agenda of President Duterte. He signed an Executive Order creating the Energy Investment Coordinating Council, which will streamline the regulatory procedures affecting energy projects. Kalinga has been known as a geothermal prospect for over 50 years. In 1964, it was identified as one of the top three geothermal prospects in Luzon for power production.

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## The Permian Basin Receives

### Two New Waste Facilities

Adapted from Information by Petro Waste Environmental LP

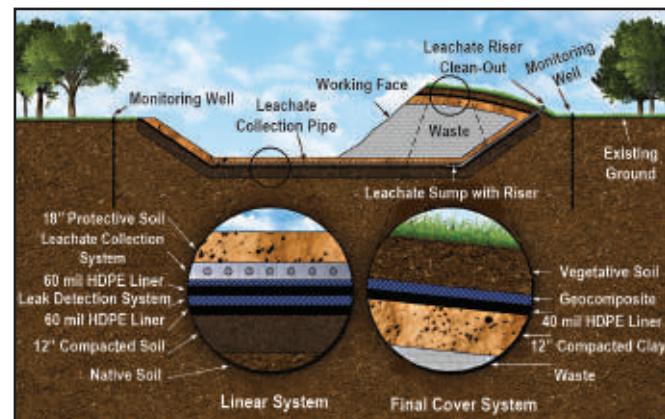
Petro Waste Environmental LP started construction on its Deep Six and Big Lake landfills in the Permian Basin. The Deep Six landfill facility is a joint venture with Trinity Environmental Services I, LLC, while the Big Lake facility is wholly owned by Petro Waste. When the facilities open this year, Petro Waste will have more landfills operating in the Permian Basin than any other gas and oil waste disposal company.

The Railroad Commission of Texas (RRC) and the U.S. Environmental Protection Agency (EPA) sets strict regulations for processing and disposing of various forms of waste created by the exploration and production of gas and oil. Companies have been able to extract hydrocarbons more efficiently because of technological advancements, but these new techniques have increased the volume of nonhazardous solid wastes and high-solids-content waste fluids. These wastes consist primarily of oil-based drilling muds and cuttings, as well as high-solids-content frac flowback water. Because of minimal infrastructure near drilling sites with the capability of efficiently processing and disposing of these wastes, large quantities must be trucked over long distances to the few existing facilities capable of accepting the materials.

Petro Waste is addressing this infrastructure shortage. By constructing highly advanced, RRC-permitted waste processing and disposal facilities, and strategically locating them throughout the Permian Basin and the Eagle Ford Shale Formation, the company hopes to reach its goal of having one of their facilities within 30 miles of any drilling activity in those plays.

The Deep Six landfill facility will be built in Reeves County, Texas. It will accept oil-based mud, water-based mud, oil-based drill cuttings, water-based drill cuttings, contaminated soil, and RCRA-exempt nonhazardous exploration and production waste, as well as provide washouts and other ancillary services. The Big Lake facility, located in Reagan County, Texas, will offer the same services as the Deep Six facility, while also selling freshwater and high-quality aggregate.

"We are strategically positioning our facilities to enable oil and gas producers throughout the Permian Basin to operate more cost-efficiently, while keeping environmental impacts to a minimum," said Petro Waste Founder and CEO George Wommack. "The Deep Six and Reagan (Big Lake) landfills are a big step forward toward realizing our company's mission."



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The pipeline replacement project is part of SoCalGas' Pipeline Safety Enhancement Plan, a multibillion dollar program which tests and updates the natural gas pipeline infrastructure in Southern California. Since the program began in 2013, SoCalGas has conducted hydrostatic pressure tests on 94 miles of pipeline, installed 89 miles of new pipe, and installed or upgraded 152 valves to be automatically or remotely controlled throughout its service territory. The company's investments help deliver reliable energy while keeping bills affordable for customers.

Ralph L. Franklin, Councilman for City of Inglewood said, "Thank you, SoCalGas, for the investment that you made in the Inglewood community and for your efforts to provide your customers with a safe and reliable product and service. Your commitment to keep City Officials and City Staff members updated on the project's progress, along with your efforts to proactively address the concerns of Inglewood residents insured a relatively smooth project with very little inconvenience and/or disruption. This was a job well done and conducted with great professionalism."



## Frequently-Used Geological Terms Part 77

*Glossary Adapted from the Dictionary of Geological Terms*

MIN



**R ~ Radiometric Dating** - Calculating an age in years for geologic materials by measuring the presence of a short-life radioactive element, like carbon-14, or a long-life radioactive element plus its decay product, such as potassium-40/argon-40. The term applies to all methods of age determination based on nuclear decay of naturally occurring radioactive isotopes.

**Raise** - A mine shaft driven upward from a lower to a higher level.

**Rank** - The degree of metamorphism in coal. It is the basis of coal classification into a natural series from lignite to anthracite.

**Rapakivi Texture** - A texture originally described from Finnish granites. In typical specimens, flesh-colored potassic feldspar occurs as rounded crystals a few centimeters in diameter which are mantled with sodic plagioclase (feldspars dominant in sodium).

**Rare Earths** - Oxides of a series of 15 metallic elements, from lanthanum to lutetium; as well as three other elements, yttrium, thorium, and scandium. These elements are not especially rare in the earth's crust, but concentrations are. The rare earths are constituents of certain minerals. Often abbreviated REO.

**Rayleigh Wave** - A type of surface wave having a retrograde, elliptical motion at the free surface.

**Raypath** - The imaginary line along which wave energy travels. A raypath is always perpendicular to the wave front in isotropic media.

**Reaction Line** - In a ternary system, a boundary line along which one of the two crystalline phases reacts with the liquid, as the temperature is decreased, to form the other crystalline phase.

**Reaction Pair** - Any two minerals, one of which is formed at the expense of the other by reaction with liquid; any two adjacent minerals in a reaction series.

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## TEC-11 Horizontal Well Gets Key Approvals in Mexico

Adapted from Information by International Frontier Resources Corporation

Mexico is the ninth largest producer of oil in the world and eleventh largest in terms of net exports. The country's main upstream attraction is a potentially vast resource base. It is estimated there is as much as 115 billion barrels of oil equivalent yet to be discovered, roughly three times as much as current proven, probable, and possible reserves.

The Tecolutla block is in the Tampico-Misantla Basin located within the state of Veracruz. In 2017, IHS Markit identified Tampico-Misantla as a potential super basin. The producing carbonate oil reservoir

in the Tecolutla block is the El Abra Formation. Seismic surveys have been conducted over the entire block and seven vertical wells have been drilled by PEMEX to bring the field into production.

International Frontier Resources Corporation (IFR) announced its joint venture Tonalli Energia has secured the necessary approvals for the company's first conventional horizontal (TEC-11) well at Tecolutla.

Mexico's National Hydrocarbons Commission has approved the modified evaluation plan which permits Tonalli to commence drilling the TEC-11 well. Tonalli has also received approval of its environmental plan for the TEC-11 well from the Energy and Environment Security Agency.

All major services including the rig required to drill the TEC-11 well have also been secured. The TEC-11 well is planned to penetrate the Tecolutla reef at a vertical depth of approximately 7500 feet with a horizontal leg up to 3280 feet.

TEC-11 is the first horizontal well of a potential multiwell drilling program for the Tecolutla block. Information gathered from Tonalli's recently drilled TEC-10 vertical well, including permeability porosity and pressure data, indicate the reef at Tecolutla is capable of high deliverability.



*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:*

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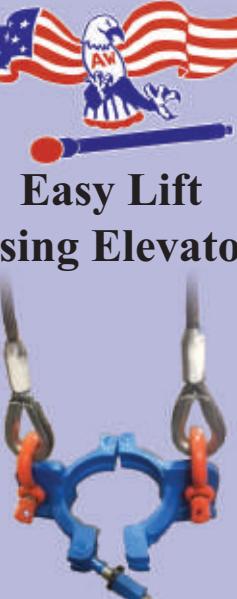
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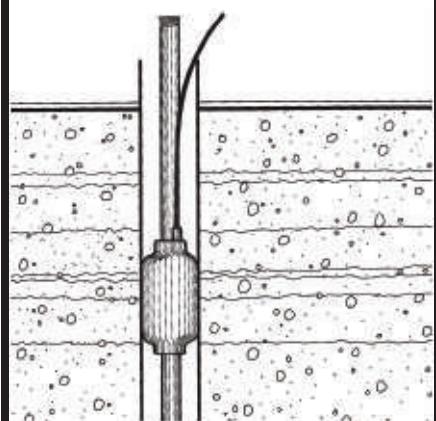
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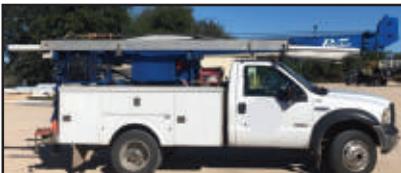
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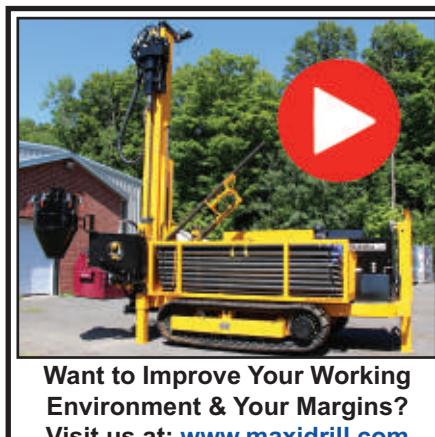


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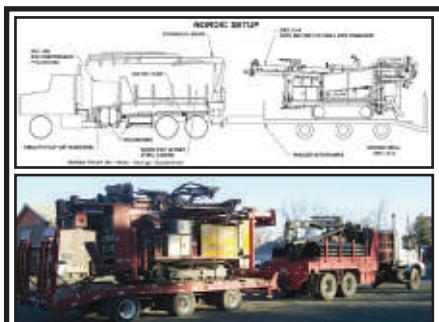
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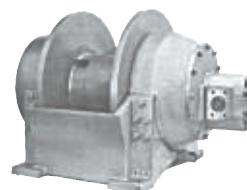
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