Making Connections

The Official Publication of the Louisiana Ground Water Association
Volume 6 Issue 1 Summer 2021

From the Executive Director's Desk

As I sit here today, the world is beginning to look different than it has the last fifteen months. I believe we have turned the corner on COVID-19, the financial picture seems to be improving, and we had a successful "in person" convention. It sure feels good to finally have COVID-19 and Zoom on the run.

Our one-day convention went very smoothly on April 13th, with almost 150 people in attendance. The speakers were well accepted, and I heard a lot of our members comment on the interest in the topics presented. If you have topics that are applicable to our industry and a possible presenter, please let me know, and I will try to arrange it. This is your convention, and we would like to deliver presentations that fit the needs that will aid you in your business.

The 2022 Convention has been set for January 12, 2022. Thank God for the Paragon and the large event center. We can do everything in one confined area without conflict from other activities in the building. Eating at the buffet we all enjoy is still a challenge, but maybe that problem will be resolved by January.

As we approach our busiest season of the year, I urge you to be safe, contact 811 before you dig, watch out for overhead power lines, protect your health, and love your families.

Remember, you are dealing with the most precious resource on earth!

Joel

Joel Walton
LGWA Executive Director

Inside this issue:

The views expressed in Making Connections do not necessarily reflect the position of the Louisiana Ground Water Association. We believe in free speech and encourage contributors to voice their opinions.

Special thanks to the advertisers supporting this newsletter:

Get Association Help™
Division of WorldWide Drilling Resource, Inc.
PO Box 660
Bonifay, FL 32425-0660

Chicot Aquifer Faces a Critical Shortage

With Louisiana frequently losing its fight against rising sea levels and increasingly frequent flooding, it seems the state has too much water, but appearances can be deceiving. Deep beneath its swampy landscape, the state is facing a serious groundwater shortage.

Groundwater levels in and around Louisiana are falling faster than almost anywhere else in the country, according to U.S. Geological Survey data.

Agriculture uses more than 61% of Louisiana's groundwater, and a centuries-old law gives landowners "ultimate dominion" over groundwater beneath their property. Farmers, industry, and homeowners can take as much as they want, when they want it - no fees required. Tim Duex, a professor of hydrology at the University of Louisiana at Lafayette said, "If we continue with the current trends, then at some point in the not-too-distant future, there will be a drastic change, and we'll have to switch to some alternative water source." But there is no alternative water source in this part of the state.

The U.S. Environmental Protection Agency classifies the Chicot aquifer system as a "sole-source aquifer". This means there is no other source of water for people who live between Lake Charles and Lafayette. The state's largest and most important aquifer is losing water faster than it can be replenished. Approximately 661 million gallons are consumed each day, while only about 313 million gallons are being returned through rain or natural drainage. The three primary water users in the region - agriculture, industries, and public suppliers - draw almost exclusively from the Chicot. Overpumping has contributed to the formation of an elongated cone of depression in the heart of Louisiana rice country, the third highest producing region in the nation. U.S. Geological Survey models depict the cone's center west of Lafayette with more than 9000 square miles of groundwater in that area already flowing toward the center of the cone.

This creates another threat: saltwater intrusion. Overpumping reduces the downward pressure exerted by freshwater in the aquifer, allowing seawater from the Gulf of Mexico space to enter and fill the gap. Deep groundwater wells in the area of Chicot's cone of depression have been inundated by saltwater. If the aquifer is drained or contaminated with saltwater, desalination may be the only way to access usable water, but desalination plants are costly. One estimate puts the cost of desalinated water at more than twice as much as conventional means of freshwater delivery.

Environmental Quality Manager Terry Emory at West Monroe's wastewater treatment plant. Photo courtesy of National Public Radio.

Most states have multiple regional committees overseeing groundwater resources. But there are only two in Louisiana, and Chicot, Louisiana's most heavily used aquifer, still has no regulatory oversight. The Louisiana Department of Natural Resources technically oversees water, but spokesman Patrick Courreges says it can't do much. "We feel like we're right up against the edge of our regulatory authority," he said. "We are doing the best we can with what we're empowered to do."

Without state-level leadership, some communities worked on water management themselves. The small town of West Monroe in northern Louisiana began to experience water shortages twenty years ago. The biggest consumer was the local paper mill, which was also the town's biggest employer. Terry Emory, the city's environmental quality manager, along with other local civil servants, devised a plan. A federal and state grant cost $20 million, and the multi-faceted wastewater treatment plant took years to build. Today, this plant ships clean water to a nearby paper mill, a partnership decreasing industrial overuse of the region's groundwater resources. Turning wastewater into usable industrial water helped to avoid a crisis.

Marc Davis, director of the Center of Environmental Law at the University of Tulane, said if the state had a law to protect groundwater, a small town like West Monroe wouldn't be forced to come up with such an expensive solution. Instead of leaving it to "individuals and fate," Davis says Louisiana needs laws, as other states have, to protect groundwater.

Newsletter contents prepared, printed, and published by GET ASSOCIATION HELP™, a division of WorldWide Drilling Resource, Inc. for the use and benefit of the Louisiana Ground Water Association.

GET ASSOCIATION HELP
a division of
WorldWide Drilling Resource, Inc.
Home of Solid Gold Service – with a smile!™

PO Box 660
Bonifay, FL 32425-0660
850-547-0102

The Louisiana Ground Water Association: Helping to preserve a priceless resource - the Louisiana groundwater aquifers and recharge areas.

LOUISIANA GROUND WATER ASSOCIATION, INC. LGWA FOR BETTER WATER

PO Box 202
Prairieville, LA 70769-0202
225-744-4554

Membership in the Louisiana Ground Water Association (LGWA) is open to water well and geotechnical drilling professionals. LGWA and its members are active throughout the State of Louisiana.

Did You Know?

Although you may know cows “burp” methane, a potent greenhouse gas, did you know natural lakes and man-made reservoirs also “burp” methane?

Methane is typically produced in environments that have low oxygen, like in the belly of a cow or in sediments at the bottom of a lake. In lakes and reservoirs, some of the dissolved methane from bed sediments occasionally bubble up to the surface, similar to carbon dioxide in a soda, and escapes into the atmosphere. This water burping phenomenon is called ebullition.

Both natural lakes and man-made reservoirs serve as global sources of methane, but is one gassier than the other? Do different factors control methane emissions in these different water bodies? Two early career scientists set off to find out. Dr. Bridget Deemer and Dr. Meredith Holgerson reviewed data from hundreds of lakes and reservoirs across the U.S. to discover what different causes drive the methane emissions in lakes and reservoirs.

Generally, man-made reservoirs “burp” more than natural lakes. Also, the primary drivers in lakes and reservoirs are different. Methane production from reservoirs is mostly driven by photosynthesis, with reservoirs with more algae emitting more methane. On the other hand, methane production in natural lakes is primarily driven by the size and shape of the lake, with photosynthesis contributing to a lesser degree. The results of this study have the potential to better inform predictions about climate change and target future emission reductions.

Driving with Safety in Mind

Keeping insurance costs and expenses to a minimum is important. Rear-end collisions are among the most common vehicle-related accidents. What does this tell us? Obviously, drivers aren't paying enough attention to the road. This is something easily controlled if you are driving with safety in mind.

Water well drilling professionals drive big trucks with heavy rigs attached. Have you ever seen one of these trucks smash into the back of a compact car? I hope not, because it isn't pretty. Not only can a careless accident like this put your truck and rig out of commission, it could be devastating for those in the compact car you just hit. What if you have several trucks driving to a job and one rear-ends the other? It happens - and will put both vehicles in the repair shop. The bottom line here is these accidents could all be avoided if the drivers had safety in mind.

So, how do we begin to work with safety in mind? These tips will help better manage your driving safety:

1. Thoroughly screen all drivers - Run a motor vehicle report to make sure drivers are maintaining a valid driver's license and safe driving record.

2. Train all drivers - Make sure drivers know to allow a safe distance between them and the vehicle in front. Remember, heavy vehicles stop slower than light vehicles. Take advantage of bad weather days to talk to employees about safety training.

3. Maintain your vehicles - Take time to make sure your vehicles and equipment are in good working order. Worn brakes will impede the vehicles' ability to stop.

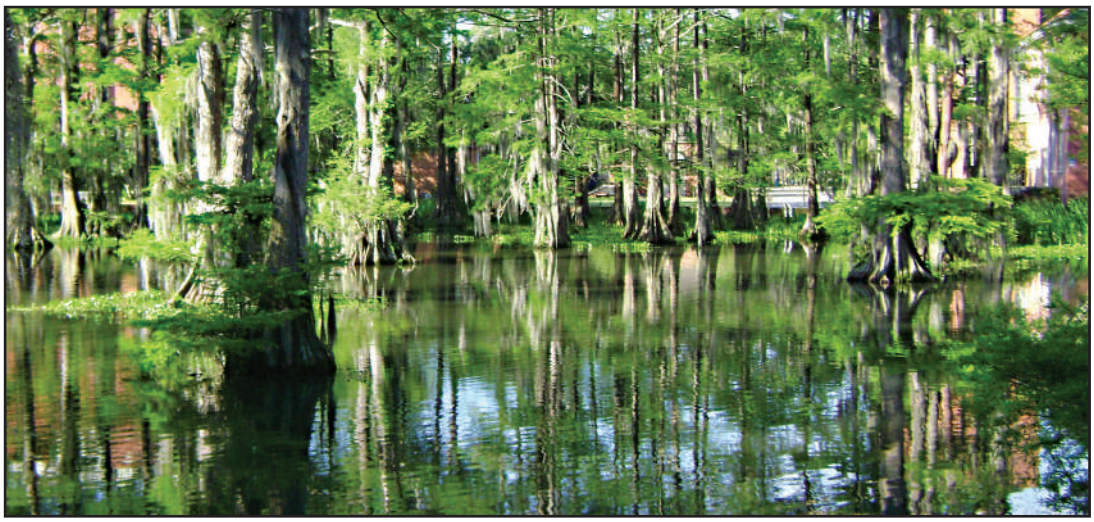
4. Communicate safety rules regularly - Talk to employees and drivers about avoiding distractions when driving. This means keep the radio volume down, no talking on cell phones, and certainly no texting. Take a few minutes each morning to remind employees to drive and work with safety in mind.

5. Check traffic and weather conditions - Knowing what's out there before you hit the road will allow you the proper time to prepare for possible adverse conditions. Check weather reports, and respect adverse road conditions.

6. Check your insurance policy - Make sure your commercial auto insurance is up to par and ready to respond when a BAD DAY does come along!

Safe work behavior can contribute directly to the bottom line. The more profitable your company, the more likely there will be funds for better equipment, improvements in the work environment, and wage increases.

Money is important but . . . personal well-being is also important. It is always wiser to spend a bit more time doing the job safely than to recover from an injury. Remember, don't take dangerous shortcuts, wear your personal protective gear, do the job as instructed, and support company safety efforts.



Why Groundwater is Important to Lakes

A lake can also be thought of as a "window into our groundwater". The water level in a lake is influenced by:

1) How much water falls directly on the lake's surface.
2) How much water drains into the lake from surface creeks, streams, and rivers.
3) How much groundwater seeps into the lake from sediments surrounding the lake's shoreline and bottom of the lake (i.e. groundwater).

(Note: This discussion applies to lakes without a surface water outlet, such as a dam, stream, or pumping system).

How much water entering the lake from groundwater depends on many factors, including the size of the lake's surface drainage basin vs. the size of the lake. The size of the lake may easily be 1/10th, or less than the land area that contributes groundwater to the lake. This land around the lake or drainage basin acts as a large "sponge" storing groundwater which "feeds" the lake 365 days a year. During rainy seasons, the sponge fills up and stores water. The amount of groundwater in the sponge affects the long-term lake level. If groundwater levels are low due to long periods of little rainfall (droughts), the lake levels will begin to fall rapidly, especially in summer months when the evaporation is high and little seepage is contributing to the lake.

Healthy high water levels in lakes are best achieved by long periods of steady rainfall which saturates the ground for many days. These conditions tend to fill up the sponge or sediments that makeup the lake's drainage basin, which in turn, will seep groundwater into the lake for months to come. On the other hand, intense rainfall events over short periods of time tend to provide much more runoff to the lake; and rapid lake level rises do not maintain high lake levels for long periods of time because most of the rain occurs as runoff rather than seepage that recharges into the shallow groundwater.

Although we cannot directly impact the amount or duration of precipitation, the understanding of the factors contributing to groundwater levels helps us predict future lake and groundwater levels.

MEMORIES FROM THE 2021 LOUISIANA GROUND WATE

All photos are compliments of

The 2022 LGWA An and Trade Show has for January

R ASSOCIATION ANNUAL CONVENTION AND TRADE SHOW

WorldWide Drilling Resource®.

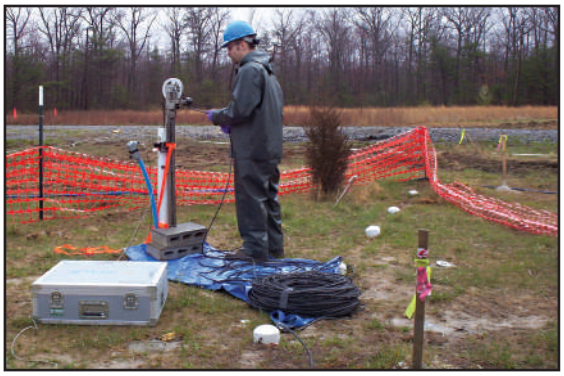
OUND WATER
VA
TTER
TION, INC.

nual Convention
s been scheduled
12, 2022

Using Borehole Geophysical Logs to Select Your Screen Interval

Selecting the correct depths to set your screens is critical when well yield (maximum gallons per minute) is important. There are many methods for determining which zones will yield the most water, depending on the type of drilling and the local geology. If the goal of the well is only five gallons per minute and there are thick zones of coarse sand and gravel, it is a much simpler task. If the geology of the site is not well known, or the customer would like to obtain as much water as possible consider using borehole geophysical logs (BHGLs).

There are many types of BHGLs available. However, to keep it simple and relatively inexpensive, I recommend an electrical resistivity log and a natural gamma log. These logs can be run on a single probe in a single trip (in and out) of the borehole. These two logs are often run on a steel cable with a single electrical wire inside to conduct electrical current to the probe. The equipment can be rented, purchased, or contracted through a logging service company. Shallow wells (a few hundred feet or less) can be logged using a small portable handheld winch assembly (rented or purchased); whereas on deeper wells it is advisable to contract with a wireline service company (query borehole logging).



Natural gamma and electrical resistivity logs measure two distinct physical parametersof geologic parameters as follows:

Natural Gamma is simply a Geiger counter which measures natural gamma radiation of the formation encountered in the borehole. “High gamma” radiation is often associated with clays and organics which generally are not desirable aquifer type material and generally are not screened. Gamma logs can be run in casings, cement grout, and drill rods if necessary.

Resistivity Logs measure the electrical resistance of the formation adjacent to the borehole. Clay and other low-permeability materials generally have low “bulk” resistivity. Clean sands, limestones, and dolomites often show “high” resistivity and produce larger volumes of water.

BHGLs are often used to pick the exact depth and thickness of the producing zones and determine if the transition between the zones is transitional over many feet, or if the contacts of the producing zones are “sharp” or transitional to aid in depth of screen placement.

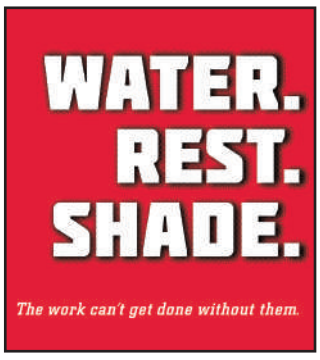
BHGLs are a valuable tool, and with experience can take the guesswork out of placing screens - and save time and money.

Overheating isn’t Cool

This summer will have drilling professionals in Louisiana wiping their brows and reaching for water. When you are doing physical work outdoors, the heat and humidity can wreak havoc on your body.

Much like a car motor, the human body can overheat and shut down. Heat exhaustion and heat stroke are more common with those who work outside directly in the sun, and should be taken seriously. Heat-related illnesses can happen quickly. There have been cases where someone was fine at lunch and a few hours later, they were unconscious or having seizures.

Heat cramps happen when you have lost body salt and fluids through sweating, and is one of the first signs of heat illness. Workers with heat cramps should replace the fluids with water or electrolyte replacement liquids such as sports drinks.



Heat exhaustion is a little more serious. Symptoms include nausea, dizziness, headache, heavy sweating, weakness, and confusion. If you or one of your employees are showing signs of heat exhaustion it is important to act quickly and get out of the heat. Cold compresses to the face, head, and neck area can help cool the body down while the worker sips cool water frequently.

Heat stroke is the most serious heat-related illness and can be fatal. This occurs when the body’s temperature-regulating system fails. The body may quit sweating, the worker may pass out, be confused, or even have seizures. If you witness someone with heat stroke, call 911 and get medical help immediately. Stay with them until medical help arrives, move them to a shaded area, loosen clothing, wet them with cool water, and circulate the air to speed cooling.

Although we are all susceptible to heat illnesses, some people are at greater risk such as those with diabetes, kidney or heart problems, or those who are out of shape or overweight. Not being used to working in the heat is also a big factor. In fact, most of the people who died from heat stroke were new to working outside in the sun. If you haven’t worked in the heat for a while, you need to take more breaks until your body gets acclimated, which can take up to two weeks.

Water is key. Employers should make sure there is plenty of water on the jobsite and keep an eye on workers to make sure they aren’t showing any signs of heat illness.

To prevent heat illness:

☼ **Wear light-colored clothing** ☼ **Drink plenty of water** ☼ **Take shade breaks** ☼ **Rest**

Using Beer to Treat Wastewater

The town of Havre, Montana, was presented with an Honorable Mention accolade from the Environmental Protection Agency (EPA) for its innovative, money-saving solution to sewage and wastewater treatment expenses.

The city of Havre received over $10 million in assistance for improvements to its activated sludge treatment plant. The nearly 40-year-old facility needed upgrades to help meet their final ammonia and residual chlorine limits. The treatment system was converted to a biological nutrient removal system and existing aerobic basins were rehabilitated.

Additional basins were constructed to create anaerobic, anoxic, and aerobic environments needed for treatment. These basin configurations promote nitrification and denitrification for nitrogen removal, as well as enhanced biological phosphorus removal. The chlorination system was replaced with an ultraviolet disinfection system.

Despite the costly upgrades, the city was looking at spending another $1 million because they still had high phosphorus and nitrogen levels, which can cause dangerous algae blooms in rivers and lakes. Unfortunately, the more than ten nearby breweries generated beer waste that was rich in yeast, hops, and sugar - which are known to disturb the microbial activity process that removes both nitrogen and phosphorus from water as it is being treated. So if nitrogen and phosphorus were not removed before the treated water went downstream, bacteria and algae blooms could occur, which would disturb the water chemistry enough to adversely affect the ecosystem.

Plant Manager Drue Newfield had the novel idea to use beer waste, or spent barley, in the water treatment process as an external source of carbon and volatile fatty acid supplement to further enhance the biological phosphorus removal process by feeding the microbes. The spent barley grains which remain after the brewing process, are no longer useful for making beer, but still contain nutrients that feed naturally occurring chemical-fighting bacteria. Newfield reasoned that if the spent barley was introduced in just the right place in the water treatment process, it would be very beneficial. After a lot of troubleshooting, they determined just how much spent barley to add to the wastewater to make the bacteria “happy”.

After three years, these improvements allowed the facility to continuously meet all permit effluent limits and has significantly improved the operability, reliability, and treatment capability of the plant. The upgrades have greatly improved the quality of wastewater discharged to the Milk River, particularly with respect to nutrient levels and ammonia toxicity.

Common Causes of Well Failure

When looking at examples of problem wells, some common themes stand out. One of the most common causes of well failure is in the well design and construction process. The six main areas where we see issues with well construction and design are:

1. Well Seals: Many wells are constructed using state standards as de facto construction standards when geology should really be the guide. We find problems with things like nitrates and total coliform are often directly traceable to inadequate seal depth.

2. Screen and Casing Materials: It may seem like a great idea to save money on a well using low-carbon steel casing and stainless steel screen, but you are really setting yourself up for galvanic corrosion of the low-carbon steel, substantially shortening the life span of the well. Using dissimilar metals in a well without a dielectric coupling.

3. Screen and Gravel Size: The wrong choices here can lead to a sanding well if the screen openings are too large and the gravel not sized appropriately for the screen. Similarly, too small of a screen opening can lead to an inefficient well, which is also challenging to develop properly.

4. Bridging Issues: Installation of gravel pack during well construction can result in voids due to bridging, which can result in later sanding issues. Settling can have a similar effect, if inadequate gravel is placed over the top of the upper screen section, settles during development, and well use causes the top of the gravel to drop below the top of the upper screen section.

5. Welds: Welds are a common point of failure due to preferential corrosion of welds due to differences in metal types. Video logs of wells should be conducted after well completion to verify construction, and later video logs should pay attention to welds to check for corrosion issues.

6. Plumbness and Alignment: A well that is not straight and plumb will often have problems with construction and pump operation, although submersible pumps can be a bit more tolerant of well deviation than turbine pumps.

Most of these issues can be addressed by paying attention to the geology while drilling or, even better, understanding the geology and aquifer characteristics at the well location prior to drilling. A preliminary well design modified by geologic conditions encountered during drilling is often the most effective approach.

Another common cause of well failure is inadequate well development. A well that is not developed properly can underperform its entire life, resulting in premature failure.

The purpose of well development is to remove drilling mud and "skin" damage on the borehole wall; to settle the filter pack and remove sand "bridges" and other formation fines; remove fines/sand from within the well; and reduce turbidity. All these actions, of course, result in the most efficient flow of groundwater to the well. So, what can go wrong with well development? A lot, actually!

Not enough time devoted to well development: The development component is almost always underbid, usually resulting in a change order if the well development is done correctly. If significant quantities of drilling mud are lost into the formation during drilling, the development process is going to take longer.

Not using measurement parameters during development: Measurement of specific capacity, sand, and turbidity, at a minimum, and continuing development until no substantial improvement is noted in any of these parameters will assure complete development.

Delays in starting the well development process: Especially in wells drilled with mud, delays in starting the well development process can result in the mud gelling to the point where it becomes difficult or impossible to remove, resulting in a well that permanently underperforms.

Not using the proper development techniques: Most drilling muds are going to contain a certain amount of polymer to enhance their effectiveness during drilling. This can present problems during the development process as dispersants that work well on the actual bentonite-based mud, are less effective in removing the polymers, which can often require something like chlorine to break them down effectively.

Contaminants in drilling mud: Evidence is mounting that drilling mud can contain arsenic, lead, mercury, chromium, magnesium, etc., making it critical that all the mud is removed during the development process to avoid "phantom" water quality issues.

Protecting the Top of the Well

Many of us - well drilling contractors or scientists - are often involved with the decision of where a well is to be located. Careful consideration should be given to a well's location, including potential sources of contamination - such as septic tanks, chemical storage, fuel tanks, etc. Wells should generally be located upgradient and in topographically high areas where runoff or flooding cannot enter a well. The well casing should "stick up" a few feet above land surface to ensure runoff will not enter a well. In situations where a well must be put below land surface, in a vault or parking lot with a drivable cover, the well should have a watertight well seal to prevent leakage into the well. The top of the well should be slightly elevated to "deflect" runoff away from the vault.

We, as contractors, should protect all open wells. If we leave the borehole at the end of the day, we need to place something heavy over the top of the well. If we pull a pump, we should cap the well with a locking or secure cover. You may even consider attaching your name and contact information, which could lead to business in the future.

After completion of the well [it's ready for use], the top of the casing should be properly capped to prevent vandalism or accidental contamination. Expandable well plugs or threaded caps tightened with a wrench should be installed to protect the well. For some reason, kids of all ages have an attraction for open wells and will often drop rocks or debris in the well, and even try to fill the well with whatever materials are nearby that will fit into the well.

Another reason for protecting the top of the well is to protect the aquifer. If even a small amount of the wrong chemical(s) were to enter the well, it could contaminate the aquifer over a large area for many years to come, and remediating the aquifer could cost tens of thousands of dollars to cleanup.

An ounce of prevention is worth much more than a pound of cure when it comes to protecting the top of the well.

Being a Professional Takes Work

Professionalism is rarely taught. It's something you cannot buy with a diploma, years of experience, or talent. But somewhere along the way, you're supposed to pick it up on your own through a combination of observation and gradual learning. It's something you choose.

So what exactly does it mean to be a professional? In the most basic sense, a professional is someone who gets paid regularly for something they do. For example, athletes are "professionals" when they get paid to play, and "amateurs" when they're not paid.

Can you call yourself a professional? If so, be proud of your hard work!

If you're a drilling professional in the literal sense, you accept money in exchange for drilling services. Because your craft is your livelihood, it is assumed you hold yourself to a higher standard of service, if for no other reason than to keep clients and revenue coming.

But isn't there more to your work than just dollars? Being a professional isn't merely receiving payment for a service. It also means valuing yourself and your services fairly, being generous, sharing knowledge, and always giving a bit more than you receive, with confidence, you'll eventually reap what you sow. It means giving people more than they expect every time.

To deliver the best possible service to your clients, you must constantly be at the forefront of your field. In jobs like drilling, where regulations and codes can change, up-to-date knowledge is especially important. It's not enough to simply punch in and out every day. Keeping your skills and understanding fresh requires time and effort put forth by attending classes and seminars, or doing self-guided research. Going the extra mile is all in a day's work. It shows you care about your profession, and you deliver cutting-edge service at the same time.

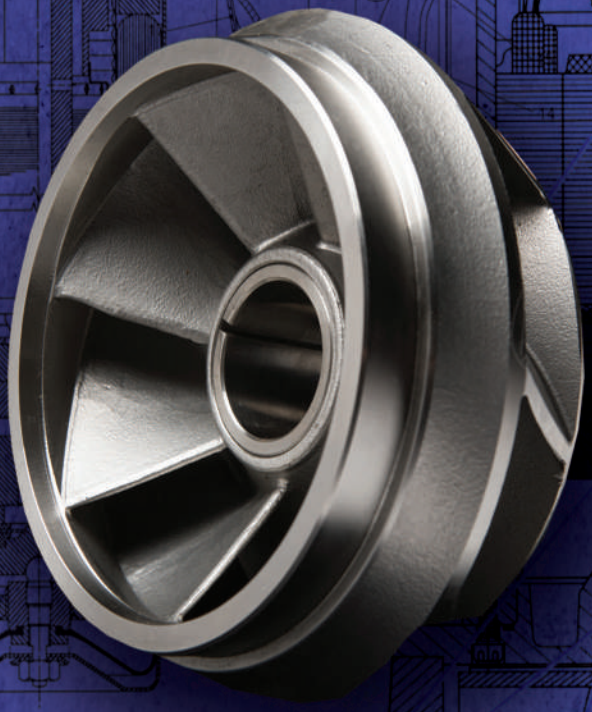
Perhaps the most important aspect of professionalism is respect. To earn the title of professional, you must treat people with nothing less than utmost respect, no matter if it is the waiter who got your order wrong, or someone below you in the workplace hierarchy.

It all comes down to the character of a person - on and off the job. It's more than qualifications and certifications. It's actually about who you are deep down.

WPS

Wholesale Pump & Supply

We Provide Solutions



$$\frac{GPM \times PSI}{1713 \times EFFICIENCY\ OF\ PUMP}$$

1-800-444-7096

WWW.WPSPUMP.COM