

HOW TO ACHIEVE REQUIRED TOP OF CEMENT IN CHALLENGING PERMIAN BASIN WELLS

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A SOLID APPROACH TO OPERATIONAL SUCCESS

Well productivity and profitability are influenced by the decisions you make every step of the way—that includes your cementing job. Think of this as a checklist for improving your prospects while minimizing your risks.

UNDERSTAND THE Obstacles to Cementing in the Permian





DEEPER, LONGER HORIZONTAL WELLS

Recently, the Permian Basin has been making headlines as one of the nation's most prolific oil and gas basins. But in fact, the region has produced hydrocarbons abundantly for nearly 100 years. Spanning West Texas and southeastern New Mexico, the Permian consists of several smaller basins that include the Midland and Delaware.

Depletion of shallower, more accessible formations, combined with advances in drilling and completion technologies, are now driving exploration and production deeper.



The Permian Basin has been producing abundant hydrocarbons for nearly 100 years.



DEPLETED ZONES POSE A CHALLENGE

With decades of accumulated knowledge and experience, it's safe to assume that well construction in the Permian holds no surprises—especially when it comes to basics like cementing. But when you consider that 80 percent of existing Texas wells show sustained annulus pressure, reality suggests otherwise.

In the Permian, wells must frequently pass through severely depleted zones to get to an area of interest. These low-pressure zones can cause severe fluid losses, making it difficult to achieve the desired top of cement and leading to inadequate zonal isolation.



Cement helps to isolate these zones, preventing communication either between zones or to the surface. It also anchors the casing string, protecting it from corrosion from formation fluids.

These important factors cannot be achieved through poorquality cement jobs, which can lead to expensive remediation costs or limit the well's overall production potential.

SELECT THE RIGHT CEMENT



Cement quality is key to well performance and integrity. That's why it makes sense to optimize it from the start. Operators avoid excessive remedial costs down the road while minimizing the risk of far worse, such as loss of the well and potential damage to life, property, and environment.

With excessive annular pressure, even abandoning the well would require remediation, increasing financial loss.

SLURRY TYPE

Using lightweight or ultralightweight cements can reduce hydrostatic pressure, minimizing fluid loss into the formation. There are two common methods for creating these cements:





Since glass microspheres are precisely manufactured, batch-to-batch variations in particle size and specific gravity are rare. This results in more predictable slurry mixtures compared to ceramic microspheres. These cements also have high-set cement strength and fast compressivestrength development, and retain their strength at high temperatures.

MICROSPHERES

But it's important to ensure ingredient quality. Microspheres from suppliers may have acceptable properties at surface but shatter and lose buoyancy under downhole conditions, leading to unsuccessful cementing. Even some high-quality microspheres will break under pressure. Slurry design must account for the crush strength as well as minimize the separation of low-density microspheres to prevent excessive free water and loss of zonal isolation downhole.



Foamed cements containing microscopic bubbles of nitrogen offer good fluid loss control, better strength than water-extended slurries, high-tensile strength and ductility, and efficient mud-displacement and hole-cleaning performance.

NITROGEN FOAMING

Compressive strength of set cement is determined by the bubble size and distribution, the compressive strength of the base slurry, and the nitrogen content or foam quality. To optimize bubble distribution, laboratory tests can determine appropriate design parameters. Surface treating pressure and wellbore pressure are also important factors in set-cement permeability and porosity.

QUICK SETTING

Setting time for cement is an important consideration because the faster the slurry sets, the sooner the operators can get back to drilling. Some companies offer accelerators, which are sold separately and added to the mixture by the operator.

Accelerators can reduce setting time for the slurry down to 12 hours. An even better solution is a pre-blended quick-setting cement, which can reduce setting time down to 6 hours.

VERIFY PROVIDER TRACK RECORD & CAPABILITIES





Only a few service companies have the experience, resources, and expertise to

- recommend the optimal solution for each individual case
- design, test, and execute these specialized slurries that utilize low and high-density ingredients—customized to suit the unique challenges of each well
- achieve the required balance between well economics and cement quality
- provide superior service quality through job execution with purpose-built equipment

WHAT TO LOOK FOR

There's no room for complacency or short cuts, so selecting the right cement company is key. Essential steps for successful cementing are:

- 1. Condition the drilling fluid
- 2. Use spacers and flushes
- 3. Move the pipe
- 4. Centralize the casing
- 5. Maximize fluid velocity
- 6. Optimal slurry design
- 7. **Proper job execution**
- 8. Select a proper cementing system

An extensive track record of blending and pumping successful cement jobs in the Permian is also a plus. It boosts confidence in the service provider's ability to deliver.

LEVERAGE TECHNOLOGY & REGIONAL LOCATIONS TO INCREASE EFFICIENCY



CEMENTING UNITS WITH REMOTE MONITORING

With remote monitoring and communication capabilities, you can monitor a cement job in real time anywhere from your smartphone or tablet. Eliminating the need to drive to the wellsite reduces HSE risk and saves time. It also lets you monitor multiple jobs—which means you can be in several places at the same time.

If needed, cementing crews can also access experts at the base for advice and support.

HSE

Reduce HSE risk and save time with remote monitoring.

CEMENTING UNITS WITH FULL REDUNDANCY

The latest pump truck design offers true redundancy. In addition to backup systems for dual cement pumps, many feature redundant mixing systems as well. Most trucks will at least have dual pumps and a single mixing unit, which means operators often have a second truck on site or on standby in case the mixing system goes down. Fully redundant trucks eliminate the need for a standby truck, requiring less equipment and personnel on location boosting efficiency for the operator.



NEARBY WELL-EQUIPPED BASES IN REMOTE AREAS

In a region with numerous unmarked dirt roads, few landmarks, and even fewer maps, choosing a service provider with a local base and crews familiar with the geography can make the difference between timely delivery of services or costly delays. A well-equipped regional base with testing laboratories and facilities to prepare multiple jobs improves service quality while streamlining logistics.

LOCAL BASE

24/7

Choosing a service provider with a local base and crews familiar with the geography can make the difference between 24/7 on-time delivery of services or costly delays. Quality cement, advanced engineering, reliable execution these factors contribute significantly to your bottom line. Having confidence that your service company is giving you the field-proven expertise and accurate guidance that your unique circumstances require is equally crucial.



Nine Energy Service is an oilfield services company that offers completion and production solutions throughout North America. The Company brings years of experience with a deep commitment to serving clients with smarter, customized solutions and world-class resources that drive efficiencies. Strategically located throughout the U.S. and Canada, Nine continues to differentiate itself through superior service quality, wellsite execution and cutting-edge technology. Nine is headquartered in Houston, Texas with operating facilities in the Permian, Eagle Ford, SCOOP/STACK, Niobrara, Barnett, Bakken, Marcellus, Utica and throughout Canada. For more information, visit nineenergyservice.com.