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## RESERVOIR STIMULATION SERVICES TO INCREASE ULTIMATE RECOVERY

The shale revolution of recent years continues to provide abundant supplies of oil and gas to meet the nation's energy needs. However, while many of these wells are still producing economically, some are in need of remedial solutions to help maintain or increase production.

C&J Energy Services has a range of technologies engineered to help regain production and increase the ultimate recovery from your well. Our unmatched experience in unconventional reservoirs across North America allows us to tailor an effective and economical solution to help increase production.

- Our unmatched quality and customer-first approach is a core value that we bring to every customer we do business with.
- C&J provides a full package of services for your well including wireline services through our Casedhole Solutions Division, along with a full range of coiled tubing services.
- Our engineering group and Research & Technology Division can help identify problems and provide solutions for the most challenging reservoir.
- C&J's engineers and laboratory technicians can design a fluid system compatible with your particular well parameters. Our PureStim™ Fluid Systems can be designed to perform over a wide range of temperatures and applications.
- Safe and experienced crews are ready to help you get production online in a timely manner.

C&J's engineering group will review the initial well completion plan, study the well's production decline curve and take into account formation characteristics to devise the best solution for your well.

### **Re-Con™ Frac-less Re-Stimulation**

Pipe integrity issues can prevent high pressure treatments from being a viable option. When this is the case, C&J's proven Re-Con Frac-less Re-Stimulation is the solution.

By cleaning the wellbore and subsequently cleaning the existing fractures, perforation and formation damage can be remediated without the possibility of damaging the casing. This treatment uses a diverting process that ensures a near complete diversion of the treatment across any size lateral. Utilizing the latest in advanced chemistries and several leading-edge technologies, we provide the highest probability of engineered success for each well treatment.

### **Acid Wash Service**

Well performance is affected by many factors. Once production begins to decline, identifying the right solution is critical. Refracturing a well is often not necessary—acidizing to remove damage is often overlooked as a solution.

Depletion of the reservoir through normal production causes pressure drops across the fractures and perforations. The pressure drops can often result in damage due to:

- Scale formation from produced waters
- Organic depositions from the produced fluids
- Wettability alterations due to insufficient surfactant applications/loadings
- Emulsions from pH shifts
- Incompatible or contaminated base fluids
- Polymer damage sustained during the initial fracturing process from guar and polyacrylamide friction reducers

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Our engineers and laboratory technicians can formulate an appropriate acid system to remove the damage. These treatments can be pumped using various techniques based on the condition of a specific well. Each solution will be tailored to the individual well and formation for the most effective treatment available.

## Refracturing Service

When you look at the decline curve of any unconventional reservoir, reserves are always left on the table. Research has confirmed that not all perforations are stimulated during the initial completion.

Small mesh sands have been proven to flow back into the proppant pack. Was a large amount of 100 mesh pumped into the formation? Fines migration is one of the quickest ways to kill a low permeability reservoir. What if you could go back and try again with something better now that you have all the information?

C&J's refracturing service can help you do just that. Our engineers and chemists have selected a diverting agent that provides the best chance of diverting flow to the perforations that need stimulation the most. These diverters are non-damaging to the formation and are cost effective for your particular well.

Just as important as fluid and proppant selection, is placement of the perforations during the refracturing process. An engineered approach allows you to strategically place the perforations to get maximum reservoir contact. C&J's fit-for-purpose process provides a solution based on data already in hand.

## LateralScience<sup>SM</sup> Process

The LateralScience<sup>SM</sup> engineered shale completion process leverages commonly available drilling measurements and mud motor parameters to derive reservoir parameters commonly used in frac designs. The result is an answer product that helps guide the placement of perforation clusters so that they breakdown at a common treating pressure, resulting in uniform fracture treatment within each frac stage.

We understand capital expenditures in today's market demand increased return-on-investment from your selected well treatment. Our engineers and technical team will help evaluate your reservoir and wellbore and engineer the best possible outcome for your stimulation treatment.

*C&J Energy Services is a leading provider of well construction, well completions and well services to the oil and gas industry. As one of the largest completion and production services companies in North America, C&J provides a suite of services for the entire life cycle of the well, including cementing; directional drilling; fracturing; coiled tubing; wireline; rig services; fluids management; and numerous complementary services. In addition, we develop field-driven technological solutions and innovative products.*