OILFIELD NITROGEN SERVICES

PROVEN EXPERIENCE. TRUSTED RESULTS.
Versatile Solutions for Upstream Oilfield Applications

Cudd Energy Services (CES) supports drilling, stimulation, workover, completion and pipeline services with its customized nitrogen services.

Because of its low-density and high-pressure characteristics, nitrogen is used to support many applications. In our stimulation operations, we incorporate nitrogen to generate fracturing in water-sensitive and depleted zones to improve production. In our coiled tubing operations, nitrogen is comingleld with other fluids to lighten the fluid column hydrostatic pressure. Additionally, jetting a well with coiled tubing can be used to clean out wells and support the flow of oil or gas. A foaming agent can turn a comingleld fluid into foam that has increased suspension ability. This makes the fluid ideal in both low-rate or low-bottomhole pressure stimulation and coiled tubing applications. In addition, nitrogen is used with pressure testing to ensure fluid will not be released if leaks are detected.

CES uses customized nitrogen software programs to create job designs, allowing our engineers to perform custom analysis, data modeling and maximize job efficiency. Our Nitrogen Flow software models predict the gas flow rates in either separate or comingleld fluid. The Foam Analysis software predicts the foam quality or fluid/gas ratio for foam jobs and foam friction calculations. For multi-approach job analysis, we utilize CERBERUS by CTES, PERFORM by IHS, ProdENG by Production Associates, MFrac by Meyers and Associates, and FracPro by Pinnacle.

Experience, expertise and safety are the cornerstones of our nitrogen services. Our personnel are highly trained professionals, IADC certified engineers, and experienced specialists who play an instrumental role in designing efficient solutions.

Benefits

• Available for onshore and offshore applications
• Pumping capabilities starting at 180,000 scf/h
• Ability to replenish loads without interrupting pumping operations
• Heat recovery system for high-energy areas
• Highly trained and experienced personnel
• Designed to improve operational efficiency
Cudd Energy Services (CES) provides nitrogen services featuring a versatile fleet of high-capacity, high-rate equipment to support a wide range of oilfield applications, including pressure testing, stimulation and production transfer and unloading.

Our fleet is equipped with hydraulically driven pumps to help reduce emissions, reduce fuel consumption and improve maintenance. The high-rate units, available in 660,000 and 740,000 scf capacities, are custom designed for heavy duty oilfield applications, including fracturing and coiled tubing operations. The 52-foot queen storage vessel helps minimize transportation costs and facility congestion. It stores over 1,500,000 scf onsite to help reduce on-site traffic for reloads and provides high-rate product requirements in hydraulic fracturing operations. The nitrogen heat recovery unit delivers safe flameless heat recovery for a wide range of applications while providing significant fuel savings. In addition, each unit is equipped with temperature and pressure safety shut-down devices for emergency situations.

**Applications**
- Wellbore Jetting, Displacements, Drillouts, and Cleanouts
- Flowline Displacement and Cleanout
- Stimulation and Lift Assist
- Siphon, Velocity and Injection Strings
- Underbalanced Drill Pipe Recovery (freeing differentially stuck pipe)
- Sand Cleanout
- Burst Disk Pressurization
- Well Control Services
- Pressure Testing