

High pressure, high stakes

By MIKE PRINCIPATO

Fracing to maximize oil and gas flow

Photo courtesy of Ellis Veech

I'm standing on top of enough fossil fuel reserves to light the Las Vegas Strip for a hundred years, but I can't see my hand in front of my face.

This is no small irony at the moment; since after a 3:30 a.m. wakeup call and a 70-mile drive to a place I'm pretty sure Magellan himself couldn't find twice, I need all the light I can get. I'm desperately fumbling to fit into the nifty bright blue coverall provided by my hosts from Liberty Pressure Pumping, part of a mandatory safety getup that includes a Halloween-orange hardhat, steel-toed shoes, earplugs and goggles. I feel like I'm getting dressed for a costume ball sponsored by OSHA.

I recall the stern words of Brad Brooks, the Liberty district manager who authorized this field trip to one of the company's hydraulic fracturing jobsites. "Your safety is my primary concern," he'd said, "so you'll be escorted by one of our top guys at all times." Peering with bleary eyes through the inky night at the illuminated wellhead 150 feet away, I begin to understand Brooks' concern and why his field supervisor, Preston "P.R." Rogers, wants to keep a close eye on me during my visit today.

Calm before the storm

Given the high cost of fossil fuel exploration, fracing to maximize gas and oil flow is a must, and no company has capitalized on that acceptance by the drilling industry more successfully than Liberty. Founded by two former Halliburton executives and headquartered in Denton, Texas, in a little over two years it's become a major player in the business.

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Fracing is pure geological violence, basically engineered and monitored underground mayhem that in today's high-stakes energy industry is as much a part of the natural gas production process as well drilling itself. Right now, though, this mucky jobsite is as deceptively quiet as it is pitch black. Crew members who shuttled in from an employee pickup point in Springtown are dozing in the company mini-bus or in their own vehicles. Liberty

catering wagon chefs cheerfully prepare — free — the kind of breakfasts you'd expect workers with colorful nicknames like "Diesel" and "Chester" to eat: Huge, delicious and blissfully unconcerned with cholesterol content. Soon, however, dawn will break and Mother Nature and modern geological engineering will literally collide underground. The engineers will win, but Mother Nature will be none the worse for the battle



Photo courtesy of Ellis Veech

Heavy duty pumps driven by eight 2,000HP MTU Detroit Diesel engines are furiously forcing slurry into the well at over 8,000 psi.

after having given up some of the trillions of cubic feet of natural gas lying in the 5,000 square-mile gas reservoir called the Barnett Shale.

P.R., a former Marine who learned his trade during 10 years at Halliburton, uses the downtime to describe to me the fundamentals of hydraulic fracturing, explaining that a water-based slurry is pumped under extremely high pressure into a well to break and expand fissures around it. The slurry's chemical properties clean the cavities and help keep them open to extend the well's production life. Fracing is performed one "stage," (a fixed number of linear feet) at a time, with plastic, bullet-shaped well plugs injected into the well to close off each stage at the conclusion of every frac session.

Today's job, P.R. explains, is a small and easy frac — the well is about 9,500 feet long, roughly four inches in average diameter and, as is typical of gas wells these days, drilled horizontally to expose more of the play.

Under pressure

P.R. runs a tight ship. The first frac of the day begins right on schedule at 9 a.m., signaled by an escalation of the sounds around the wellhead and the Texas slang-tinged, friendly banter we hear over P.R.'s two-way radio. Diesel engines spool up on the 10 million-plus dollars' worth of trailer-mounted Stewart & Stevenson fracing equipment, laid out in a compact grid pattern adjacent to the wellhead, quickly building to a din that makes me appreciate my earplugs. In this business it's the sound of money being made, especially when the job is going as smoothly as this one appears to be. Howling, heavy duty pumps driven by eight 2,000HP MTU Detroit Diesel engines are furiously forcing slurry into the well at over 8,000 psi. To the right of the pump trucks, powerful blenders continuously stir up that frac frappe' mixture of water bought and drawn from a nearby private lake, hydrochloric acid, water "slickener" and sand so light that its dust hangs in the air like white mist.

This isn't your kids' playbox sand, either. Stored in enormous 400,000-lb. bins — "sandcans," in frac lingo — Liberty will actually use two types of this sand in a typical job. The first is relatively coarse and used in the early going during a frac stage to line the large fissures formed during the fracturing process; the second, ultra-fine grain sand is #50 screened and thus more expensive but necessary for narrower underground cracks.

Mission control

The orchestrated commotion around the wellhead is offset by the comparative serenity in Liberty's mobile data acquisitions van parked 50 feet away. Essentially a rolling Mission Control center for frac sites, the van is a climate-controlled headquarters for the Liberty technical staff assigned to this frac job. Seated inside, a field engineer and five senior crew members scrutinize real-time data displayed on a dozen wall-mounted flatscreen panels. Transducers mounted at the wellhead detect and relay to these screens electronic information detailing every seismic twitch, every gallon of slurry and every pound of pressure being forced into the well as the frac stage progresses. At a small, separate desk, an engineer representing the well owner monitors the entire operation from a laptop computer.

Bill King, whose Liberty business card bears the cryptic title, "Frac Treater," is supervising the mobile



Photo courtesy of Ellis Veech

Diesel engines spool up on the 10 million-plus dollars' worth of trailer-mounted Stewart & Stevenson fracing equipment, laid out in a compact grid pattern.

unit's technical team this morning. He tells me the current stage, number six in an eight-stage frac contract, is going well due to good pre-planning and friendly geology. Pointing to a bank of displays, he notes, "You can see that we're making progress through the well without major variations in pressure," which means the equipment outside doesn't have to be pushed to its limits to fracture the well to the standards expected by the customer. While we chat,

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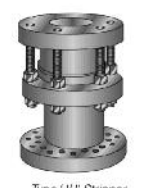
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Foam injection unit



Bill King, Liberty's "Frac Treater," is supervising the mobile unit's technical team. He tells me the current stage, number six in an eight-stage frac contract, is going well due to good pre-planning and friendly geology. Pointing to a bank of displays, he notes, "You can see that we're making progress through the well without major variations in pressure."

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two-way radios chirp with frac stage status reports between King's team and the Liberty crew outside — the frac hands — who adjust the slurry mix and flow to adapt to the dynamic conditions developing thousands of feet into the well cavity.

The dizzying array of technology inside the data center linked to the mega-bucks equipment outside is a dramatic reminder of the high stakes inherent in this business. Booming energy industry or not, launching a frac company these days takes equal measures of technical expertise, money and guts. Founded a little over two years ago with two crews, by the end of 2008 Liberty will have six crews roaming the Barnett Shale and beyond. It's this quick success and reputation for operational excellence, safety and experience that attracted Trican Well Services Inc., of Calgary, Alberta to acquire Liberty in February 2007.

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But in the drilling business, everything's local; and for P.R., every frac job requires the same strict attention to detail. Frac stage number six is about to wrap, and the diesel thunder subsides. While the crew prepares to inject the composite plug into the well that will seal off the stage, P.R. has a rare moment to reflect on the day's progress. Stage seven will begin in about an hour; stage eight and the job will likely wrap up tomorrow. He says in a day or two this Liberty crew will move on to another jobsite, helping to wring more gas or oil out of another section of the Shale. Looking a little like a father who's helped bring a new baby into the world, P.R. smiles and drawls, "We're havin' a good day." 🏠

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