

December 1996

# ProTechnology

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## Remember When?

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At this time of year, we all get sentimental and caught up in remembrance of days gone by. A few snippets of “wisdom” and paradigms from the good old days are worth reviewing. All of these “givens” have been brought to industry attention, challenged, and revised by the users of Zero Wash® tracer technology.

- **Fracture Height — 3D fracture models correctly estimate fracture height.** “The development of stress profiles and 3D fracture models has helped us understand fracture geometry, but acquiring additional field data is essential. Tracers have been used to identify minimum fracture heights that are greater than or significantly less than fracture-model estimates, causing us to redesign treatments. Often, the tracer-measured heights are validated with production or well-test analysis. In many instances, we have found tracer-measured heights to be the only independent height measurement available to compare with 3D geometry estimates.” George Voneiff - S.A. Holditch & Associates
- **Layered Reservoirs — Once upon a time, conventional wisdom inferred a single fracture system that propagated through an entire interval.** From the earliest days, multiple Zero Wash® tracers indicated the presence of separate fractures of varying sand concentrations that started and stopped in layered intervals at different times during the frac job. Today, the result is a proliferation of layered frac models. “Tracers have shown us how complex multiple fracture systems really are. We are only now beginning to realize how significantly local variations on rock properties and stresses can affect containment.” Bob Barree - Marathon Oil Research
- **Deviated Wellbores — Fractures don’t communicate with deviated wellbores over the length of the fracture.** At the recent SPE Frac and Pack Forum series held in Breckenridge, Colorado, the group consensus was that fractures in unconsolidated sands with deviated wellbores contact the wellbore along their entire length. “Available evidence suggests that soft-rock fractures are vertical and appear to remain aligned with a deviated wellbore in most instances (Gulf of Mexico Fracpacks). Minifrac and treating pressures, as well as post completion performance efficiencies, indicate excellent wellbore to reservoir connectivity. Fracture alignment with a deviated wellbore may be due to a lack of significant differential horizontal stress. Radioactive tracer surveys in this case may be useful in determining fracture-wellbore connectivity.” Dick Ellis - Pennzoil E & P Co.

# It Pays to Know

Much time and effort is spent today trying to better understand the hydraulic fracturing process. Three-dimensional (3D) numerical simulators proliferate, many of them able to do real-time estimates of fracture geometry. However, rigorous simulations require accurate bottomhole pressure (BHP) and temperature (BHT) measurements - data which are generally not available and only estimated from surface data.

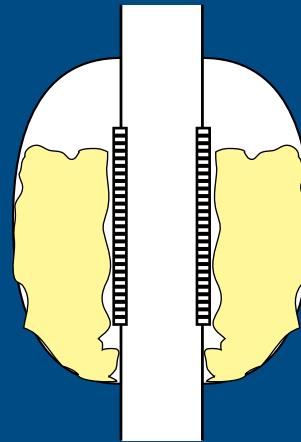
When foamed or crosslinked fracture fluids are employed, it is virtually impossible to accurately estimate bottomhole treating pressure from surface treating pressures (Cipolla et al., SPE 28491). Pressure matches may be obtained even when the BHP estimate is more than 50% in error. The nonuniqueness of pressure matching allows for such erroneous matching and subsequent error in estimating fracture geometry.

Real-time BHP and BHT estimates from RTD's Telemetry Acquisition System (TAS®) can eliminate the

systematic errors mentioned above. Additionally, real-time bottomhole treating pressure data have been instrumental in making "on the fly" changes at the wellsite to pump a more effective frac procedure during a job.

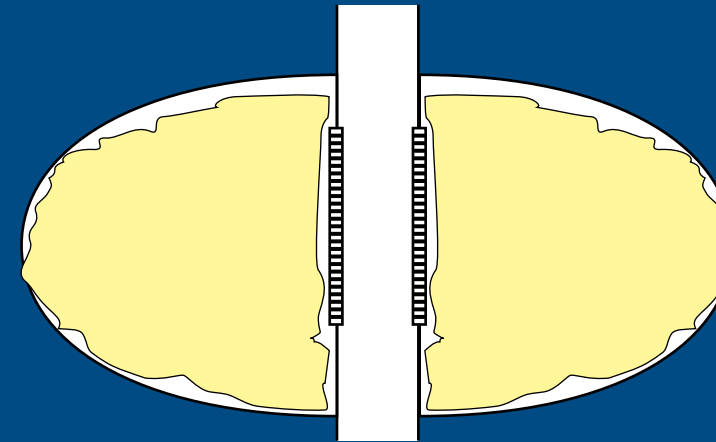
Notice how the calculated BHFP (estimated from STP) increases dramatically two-thirds of the way into this treatment, indicating a screenout in progress.<sup>1</sup> The BHFP measured by TAS indicates no pressure increase through the end of the job. The operator and service company's confidence in the data allowed the job to proceed rather than shutting down prematurely, resulting in an additional 280,000 lb of proppant being placed.<sup>2</sup> See for yourself the difference in fracture geometry achieved versus what would have been if the job had shut down prematurely. The difference to the operator from using the TAS® data is an additional 650 ft of fracture length and \$500,000 NPV at five years.

Using Calc BHFPs

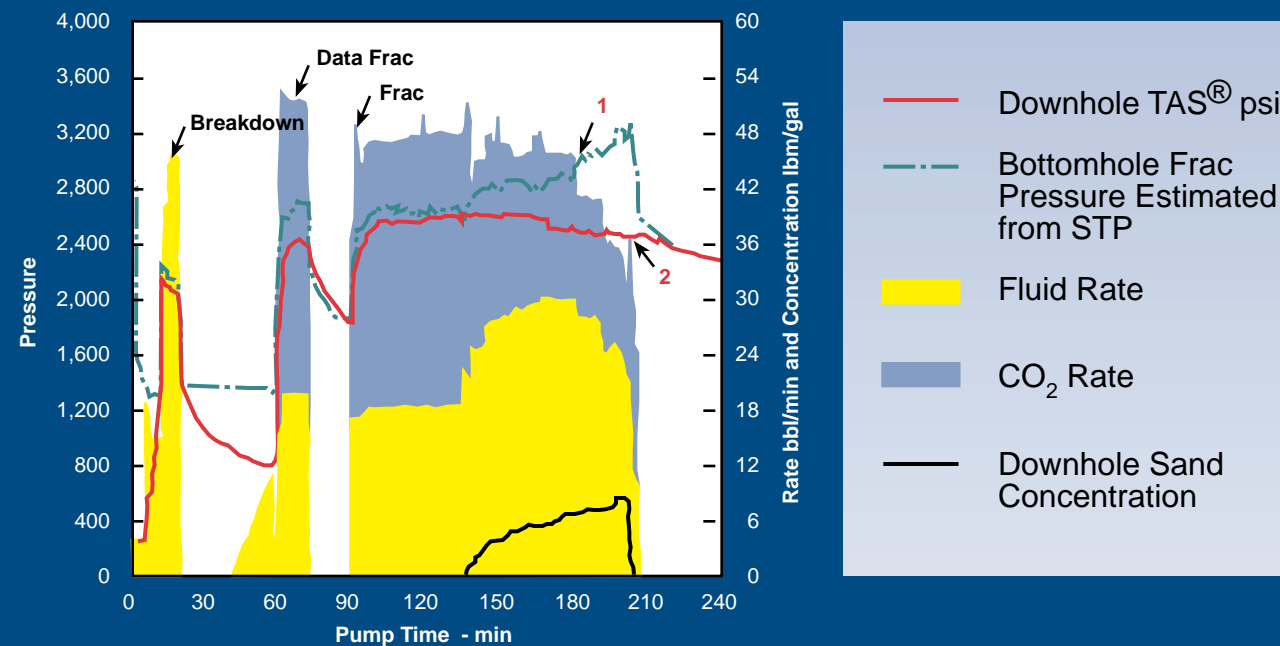


Frac Geometry after 372,000 lb Proppant

Using Actual BHFPs from RTD



Frac Geometry after 650,600 lb Proppant



## Our Phone Number has Changed

Please note that our area code in Houston has changed to 281. Our corporate office number is now (281) 496-3734 and the fax number is (281) 679-9876.



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## Breakthrough Technology

### Foam Stimulation Forum

On October 30 and 31, ProTechnics hosted industry foam experts including Phil Harris - Halliburton Energy Services, Glenn Penny - StimLab, Inc., Dave Mack - BJ Services, Satya Gupta - Canadian FracMaster, Bob Barree - Marathon, Jim Crafton - Performance Sciences, Inc., George King - Amoco, and Ron Thomas - Schlumberger/Dowell for our first ever industry effort to better understand foamed fracturing fluids. The material presented will be published in conjunction with SPE in 1997.

### Wash-Pipe Imaging

Our SpectraScan Imaging Tool has been modified to allow placement downhole inside the wash pipe during frac and pack operations. During wash pipe retrieval, the logging data are recorded. Substantial savings are achieved by eliminating rig time and lost production. This patented technology is now available to the industry.

### Home Page

Our home page is now available for browsing on the World Wide Web. Check us out at [www.protechnics.com](http://www.protechnics.com). You can also e-mail us, via the feedback section or at [protecnx@protechnics.com](mailto:protecnx@protechnics.com).

### Toys for Tots

Once again ProTechnics, in conjunction with the U.S. Marine Reserves and SPE, is conducting a nationwide oilpatch toy drive for needy youngsters. Last year we collected more than \$3,500 and 250 toys which were distributed by the Marines.

# ProTechnology

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