A Regular Technical Review for Clients
of the ProTechnics Company

Special SPE Convention Issue

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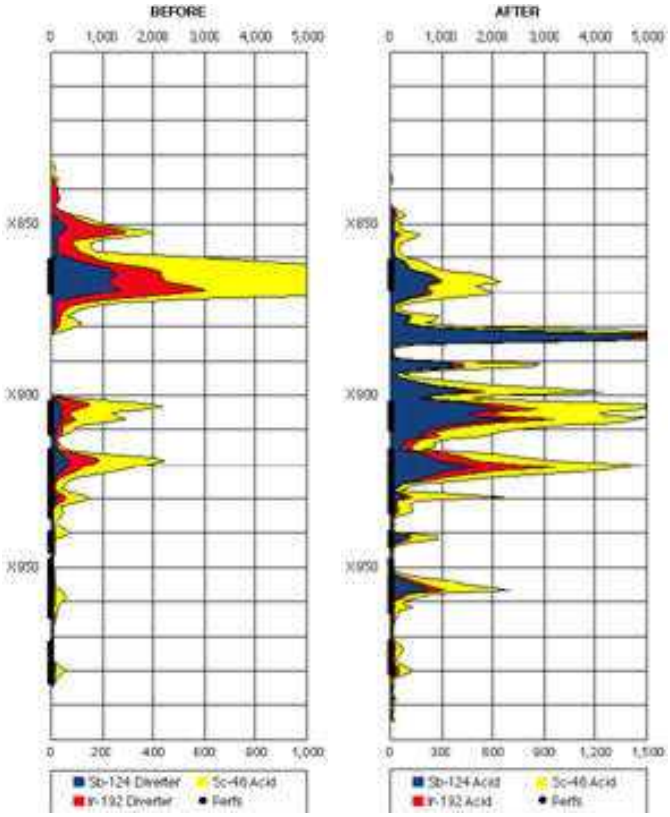
ProTechnology

Breakthrough Technology

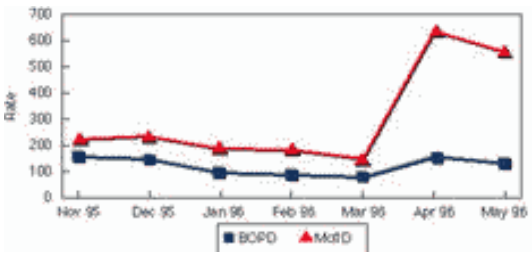
At What Cost Technology?

All too often we hear, "I can't afford to use your completion diagnostics on this job," or "the cost of the information is too high." While our technologies are some of the lowest-cost oilfield services available, in many cases they are still compared to the cost of the stimulation treatment rather than to the value they add to the reservoir.



The well at opposite illustrates an acid treatment on a well in west Texas. The "before" image shows an initial 6,000-gal acid treatment pumped in three equal stages with diverter between each stage. All three acid stages are in yellow with the diverters in red (first) and blue (last). Clearly very little diversion took place and the lower interval was not acidized.

The November-March production data indicate fairly constant production of 200 Mcf/D and 90 BOPD. Based on the lack of acid diversion into the lower zone identified by the tracers, a packer was then set at X890 ft and the lower interval was targeted and reacidized in March. As you can see, the gas production was tripled and the oil production nearly doubled with this small 3,500-gal acid treatment.

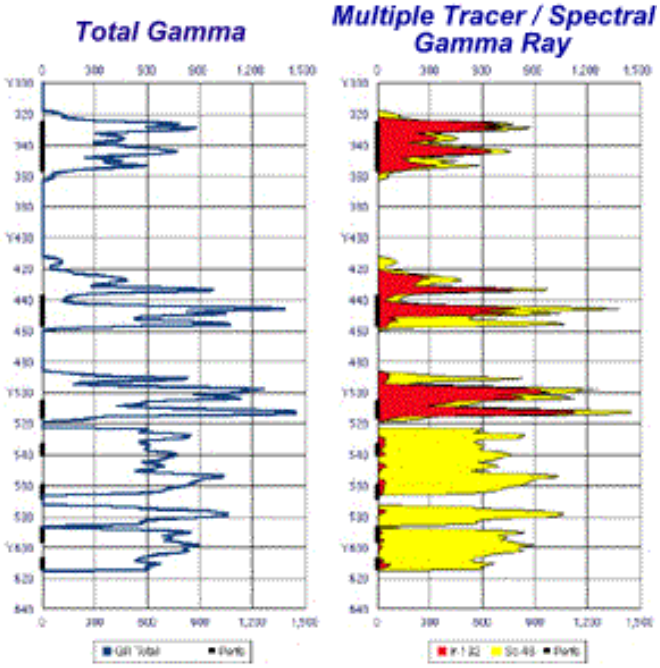


At what cost? The tracer and SpectraScan™ image cost was nearly equal to the acid job cost, but without the technology, how much of the reservoir's value would have remained unrealized? The cost of technology must be applied against the incremental reservoir value gained as a result of using the technology.

Multiply Your Value With Multiple Tracers

Radioactive tracers have been used to identify proppant placement in hydraulic fracturing procedures for 30 years. During the first 20 years, single isotopes were generally employed because of the inability to discriminate between multiple tracers. With modern spectral gamma ray tools such as SpectraScan™, identification of more than one isotope as well as radial displacement of each isotope is now a reality.

The ability to employ more than one isotope in a procedure allows evaluation of proppant entry versus time, which provides substantially more diagnostic information than single tracer/conventional gamma ray logs. In the process, a "time map" of proppant slurry entry is created to identify which downhole intervals accepted which portion of the proppant from the beginning to the end of the job. Proppant volume apportioning within the reservoir is impossible unless multiple tracers and spectral gamma ray tools are used.



These images (left) are from a single-stage Morrow completion in the Permian Basin where multiple tracers were employed. Multiple layers are present and perforations are as indicated. A total of 75,000 lb of proppant were pumped - the first 42,000 lb (1 to 4 lb/gal) traced with Scandium Zero Wash® and the last 33,000 lb (5 to 8 lb/gal) traced with Iridium Zero Wash®.

The log here presented is a total gamma ray measurement, which provides the same information as if only a single isotope were placed throughout the job. All perforations accepted proppant and count rates in the upper one-half of the interval are similar to those in the lower half below Y520 ft. That is essentially all that can be determined from single tracer and/or gross gamma ray logging services.

The next log labeled "Multiple Tracers" is the spectral image of the same well showing the location of both isotopes. Clearly the lower interval sanded off sometime during the 1 to 4 lb/gal stages, and the remaining 33,000 lb of proppant went only into the upper one-half of the interval. The lower zone is understimulated with less sand volume, less sand concentration and less fracture length than designed. These additional diagnostic data are available only through the use of multiple isotopes combined with spectral gamma ray measurement.

ProTechnics a Core Laboratories Company
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A man on Mars

No - we're not involved in the space program (yet). ProTechnics was involved with tracers and SpectraScan™ on a fracpack for Shell on the "Mars" platform. Mars holds the record for the deepest water TLP in the Gulf of Mexico.

Coiled Tubing Imaging

We also recently finished a tracer and SpectraScan™ project for ARCO at Prudhoe Bay, Alaska with the SpectraScan Imager deployed on coiled tubing in a horizontal well.

SPE Fall Meeting

Come visit us at the ATCE in Denver, October 7-9 at booth #1045. ProTechnics authored or coauthored the following papers:

- SPE 36470: *The Application of Hydraulic Fracturing Models in Conjunction with Single and Multiple Tracer Surveys to Characterize and Optimize Fracture Treatments in the Delaware Group, S.E. New Mexico*
- SPE 36673: *Improved Completions Through Integration of Completion Diagnostic Technologies with 3D Fracture Simulator in Black Warrior Basin Coalbed Methan Wells*
- SPE 36674: *Using 3D Fracture Simulation Alone May Result in Incorrect Fracture-Geometry Determination and Unreliable Real-time Fracture Analysis*

- SPE 36469: *Integrated Reservoir Fracturing and Completion Study to Maximize Productivity of Individual Niobrara Wells in Yuma County, CO*
- SPE 36596: *Optimizing Artificial Lift Operations Through the Use of Wireless-Conveyed Real-Time Bottomhole Data*

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