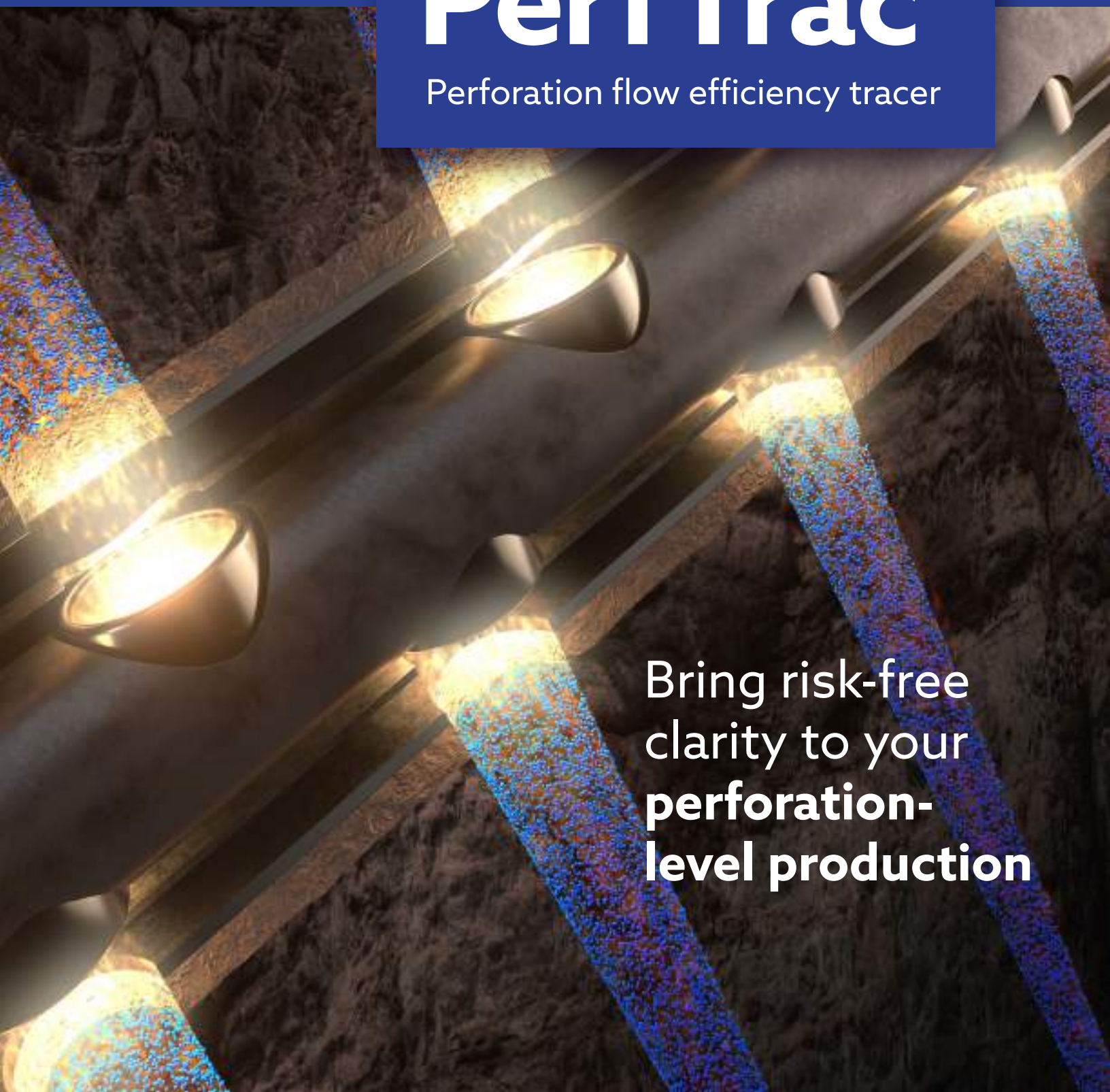
QuantumPro, Inc.

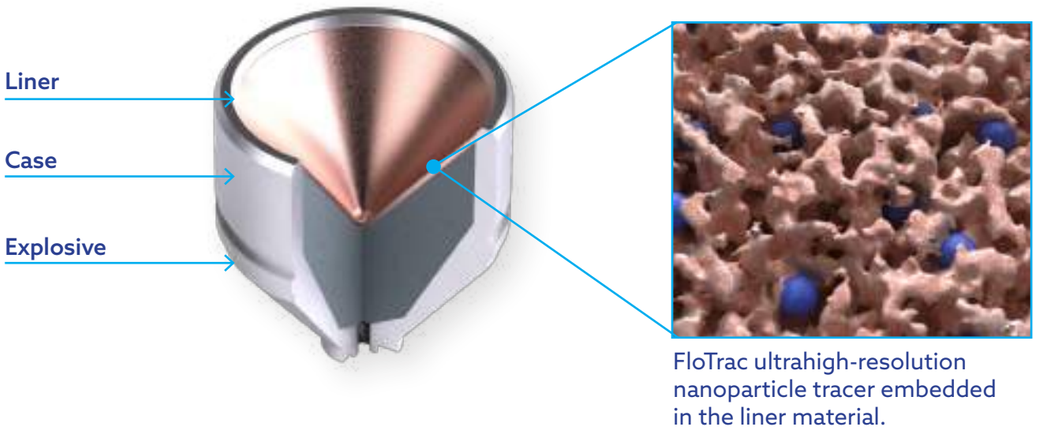
PerfTrac™

Perforation flow efficiency tracer



Bring risk-free clarity to your **perforation-level production**

Why just hope for the best, when you can have reliable insight.



FloTrac ultrahigh-resolution nanoparticle tracer embedded in the liner material.

Assessing whether a perforation has opened a quality in-situ tunnel in the reservoir for production flow has always been a zero-information proposition. While a downhole camera may confirm a perforated hole of the proper diameter, left unknown is whether debris is in the hole; if you selected the right charge to enable penetration sufficient to provide a clear pathway; or if all perforation clusters in the frac stage are stimulated for an optimal completions program while avoiding direct inter-well communication. These and other questions have long been largely unanswered and left to chance, with the full reckoning coming only after the formation has been stimulated and production well underway.

With the groundbreaking PerfTrac perforation efficiency tracer technology you can have an understanding of how each perforation contribute to well production. PerfTrac capitalizes on the field-proven diagnostic proficiency of our unique FloTrac™ ultrahigh-resolution nanoparticle tracer technology to give you nonintrusive insight into the flow mapping of your perforation holes.

Through our partnership with a leading perforation charge manufacturing company, the inert and non-radioactive nanoparticle tracers are pre-packed in the perforation charges when they arrive at the wellsite, thus requiring no onsite preparation or any additional tracer personnel. The perforation guns look and operate exactly as they do with the small tracer concentrations efficiently embedded in the charge liner, which are delivered directly into the formation upon detonation.

PerfTrac represents a win-win for the operator, as you pay only if you decide beforehand to trace and diagnose your perforation flow performance, identify any inter-well communication ("frac hits") or other applications. Otherwise, the operation and results of the perforation are indistinguishable from one that does not include the nanoparticle tracers.

Whether you're perforating a multi-cluster unconventional well, a multi-zone extended reach well offshore, or other diverse applications, the PerfTrac perforation flow efficiency tracer gives you a hassle-free leg-up in getting the most from your well with unprecedented perforation-level granularity.

Applications

- Unconventional or conventional wells
- Onshore or offshore wells
- Exploration wells
- Enhanced Geothermal System (EGS) wells
- Water injection, cuttings re-injection and waste disposal wells
- Carbon Capture Use and Storage (CCUS) projects

Features

- FloTrac nanoparticles embedded in charge liner of perforation gun
- Optional and flexible tracing and perforation flow mapping and diagnostics
- Exclusive and best-in-class partnership with leading perforation company
- Verified stability under intense shock of velocity, temperatures, and pressures
- Non-hazardous, non-radioactive and safe nanoparticle tracer materials
- Tracer concentrations tailored to perforation charge sizes and wireline operations
- Near real-time date-driven diagnostics of perforation flow efficiency analysis
- Physics-based rigorous sub-atomic detection and high-resolution flow diagnostics
- Nanoparticle tracers maintain excellent stability at high perforation temperatures
- Nearly all nanoparticle tracers dispersed efficiently into the perforation tunnel
- 220 unique nanoparticle tracers available for the cluster level flow mapping

Benefits

- Deploys easily, unobtrusively, and risk-free with minimal costs
- Provides clarity to perforation-level flow assurance and flow quality
- Requires no special handling, additional personnel or wellsite make-up
- Maintains stability under high velocities, pressures, and temperatures
- Recommends the most effective perforation remediation, if required
- Enables insightful and on-demand perforation performance and flow analysis
- Provides the best pixilation of reservoir production at each hole in the wellbore
- Improves the development plans for well spacing and well placement
- Delivers actionable, reliable and critical perforation flow data
- Helps maximize asset value and completions cluster-level flow performance



PerfTrac: A new frontier in flow assurance

PerfTrac gives you a simple, non-intrusive and highly efficient mechanism to **quantify the flow performance of each perforation hole.**

The FloTrac ultrahigh-resolution nanoparticle tracer technology established an industry-wide reputation in multi-well fracing operations for its unprecedented capacity to bring stage-level flow mapping to mainstream wells. By delivering FloTrac diagnostic power to a more granular level at each perforation, PerfTrac gives you a simple, non-intrusive and highly efficient mechanism to quantify the flow performance of each perforation hole.

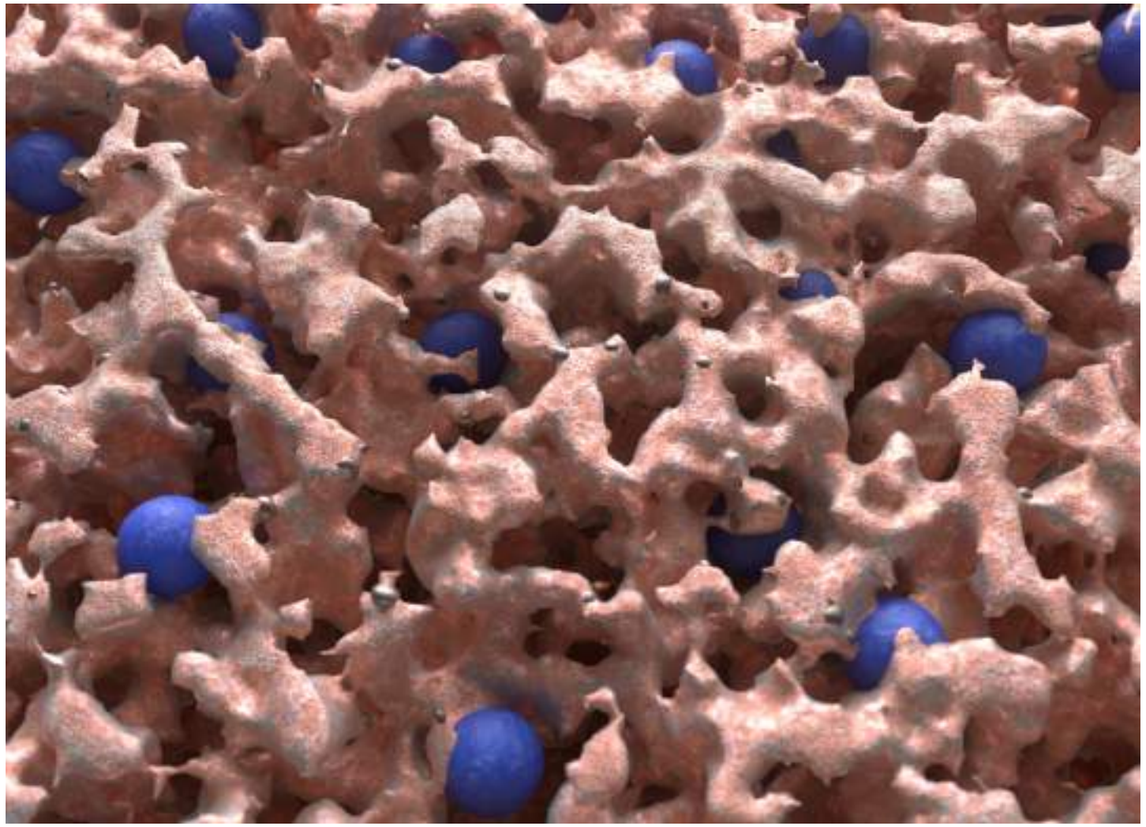
Each of the 220 uniquely tagged FloTrac nanoparticle tracers in our inventory are exclusively formulated for the highest sub-atomic detection accuracy, resolution and temperatures, and likewise maintain stability under the intense velocities, and pressures of a typical perforation. What's more, comprising non-radioactive and non-hazardous material, the small concentration of nanoparticles packed in the perforation charges pose no additional burden on the already tightly regulated perforation charges manufacturing and deployment process.

Through subsequent tracing and data-driven high-quality analysis of the returned nanoparticle tracers injected into the reservoir when the perforation hole is created, we can assess the flow assurance quality of the perforation that corresponds directly to the quality of the completions program you are preparing to develop and eventual reservoir performance.

Consider for example, the fracing of an unconventional well where each stage may include 5 to 20 clusters/stage. High-level flow diagnostics of the returned PerfTrac tracers may indicate that most, if not all, of the frac fluid will likely follow the path of least resistance and stimulate only a few clusters. Recovered PerfTrac tracers in offset wells may also indicate spacing and frac-hit problems, an improper perforation charge generating insufficient penetration or perhaps flow-blocking debris in the perforation tunnel. This granular cluster-level flow mapping data post-perf offers you vital insight to enable modifications to the perforation or frac program to help generate maximum asset value.

In other words, with the PerfTrac perforation flow efficiency tracer, we remove much of the murkiness, dubious assumptions and dramatically improve the long-term flow pixilation and measurements previously unattainable in reservoir development.





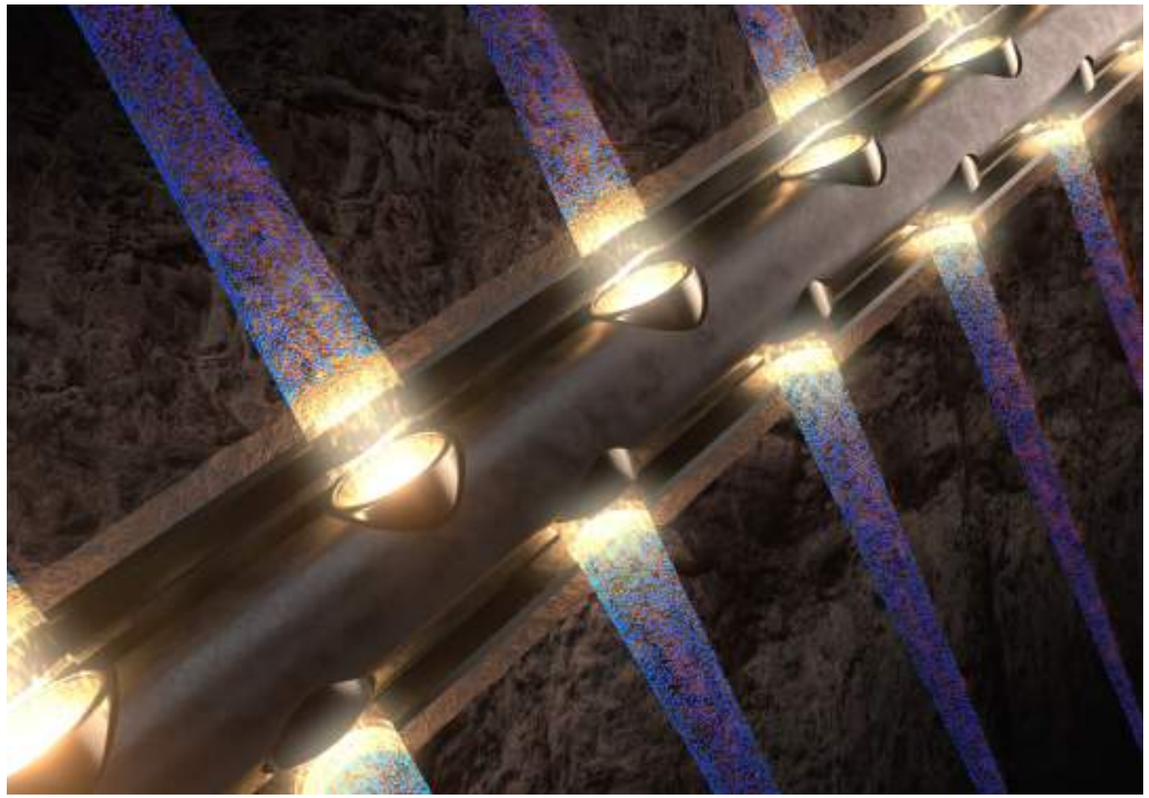
PerfTrac epitomizes survival of the fittest



No tracer technology can match the confirmed robustness and diagnostic capacity of the nanoparticles that are the foundation of the PerfTrac perforation flow efficiency tracer. Extensive testing verified the stability of the nanoparticle tracers under the intense velocities, high temperature and impact pressures induced by the shock wave created during perforating.

Much of the development work focused on the PerfTrac nanoparticle concentrations in the liner of the perforation gun, ensuring a volume that matches the specific size of the selected charge. The key here was to balance the percentage/volume of nanoparticles that the highly specialized perforation charge could tolerate without compromising hole size or perforation tunnel penetration.

Finally, a hassle-free way to assess the flow quality of your perforations



Given our exclusive partnership, the PerfTrac perforation flow efficiency tracer comes to the wellsite pre-packed in the wireline company's perforation guns. You decide whether to trace the perforation flow and analyze the returned nanoparticle tracers. If not, the production proceeds as usual with no change whatsoever in the operations or the outcome.

Nonintrusive is the operative word in that unlike attempts to clarify perforation flow quality using costly downhole cameras, retrievable fiber-optic, or production logging tools, PerfTrac requires zero onsite intervention or additional personnel. Likewise, using less durable and less unique chemical tracers pose a host of drawbacks as they tend to disperse largely in the wellbore, have limited temperature stability and spreading across multiple clusters leaves them prone to damaging cross-contamination. By contrast, the ultrahigh-resolution nanoparticle tracers that make-up PerfTrac are dispersed directly into the perforation tunnel inside the formation with minimal or no tracers left in the wellbore.

Should you so decide, an experienced Quantum-Pro, Inc. specialist will only be on site to collect returned tracer samples during production and perform advanced sub-atomic analysis for flow assurance and flow mapping diagnostics, thereby assessing the production of each perforation. The results, in turn, are encapsulated in high-quality graphic representations of production and flow performance at each perforation in the wellbore.



Get the most bang for your perforation bucks

The choice is yours, but the PerfTrac perforation flow efficiency tracer in tandem with our advanced flow diagnostic expertise gives you an unprecedented and low-cost way to get your well off to its best stimulation and production performance at each perforation. . . now.

PerfTrac™

Perforation flow efficiency tracer

QuantumPro, Inc.

To learn more about how Perf-Trac can help assess the quality of your perforation and maximize the value to your producing asset, contact **QuantumPro, Inc.** at

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