

PETROLIZE® 2nd-Generation Recombinant Enzyme system cuts wellbore cleanup time by 87% and enhance 15% production in Oman.

SPE-226540

Location: Sultanate of Oman

Petroleum Development Oman (PDO) faced significant time and cost challenges during post-drilling wellbore cleanup operations in new wells. Traditional two-step acid and enzyme systems required multiple trips, extended rig time, and posed corrosion risks to sensitive downhole tools such as MWD and LWD. To address these limitations, Epygen Labs introduced a 2nd-generation recombinant enzyme cleanup system, enabling a stabilized single-step cleanup process while keeping the bottom-hole assembly (BHA) in place

The result was a step change in operational efficiency — reducing cleanup time from 60 hours to just 8 hours, eliminating extra trips, and achieving 15–20% production enhancement across multiple wells, while ensuring full compatibility with all downhole tools.

CHALLENGE

PDO's wells, drilled with non-damaging biopolymer-based muds, often experienced productivity decline due to residual filter-cake damage. Conventional cleanup methods relied on strong acids or oxidizers, which could not be pumped in the presence of MWD/LWD tools due to high corrosion potential.

The traditional two-step process — separate enzyme and acid treatments — required pulling out the drill string before cleanup and re-running it afterward. This led to over 60 hours of total rig time per cleanup job, high exposure to corrosive fluids and HSE risks; Non-uniform filter-cake removal and potential for wormhole propagation.

SOLUTION

Epygen Labs developed a stabilized single-step enzymatic cleanup system (CUF) using a genetically engineered 2nd-generation recombinant enzyme combined with a weak organic acid. The innovative formulation provided:

- Full compatibility with MWD and LWD tools through reduced corrosivity (below 4.6 MPY).
- High temperature stability up to 120°C.
- Simultaneous polymer and carbonate removal in one step.
- Eco-friendly and non-toxic biotechnology driven solution with improved HSE profile.

The system was pumped through a Pressure-Balanced Liner (PBL) sub, located ahead of the MWD/LWD tools, allowing circulation immediately after drilling — without pulling out the BHA.

Laboratory and field tests confirmed >95% mud cake removal and full tool integrity, with corrosion and elastomer deformation within safe limits.

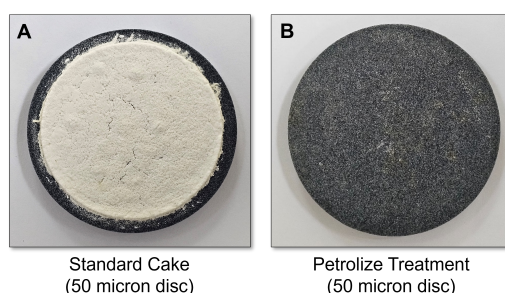
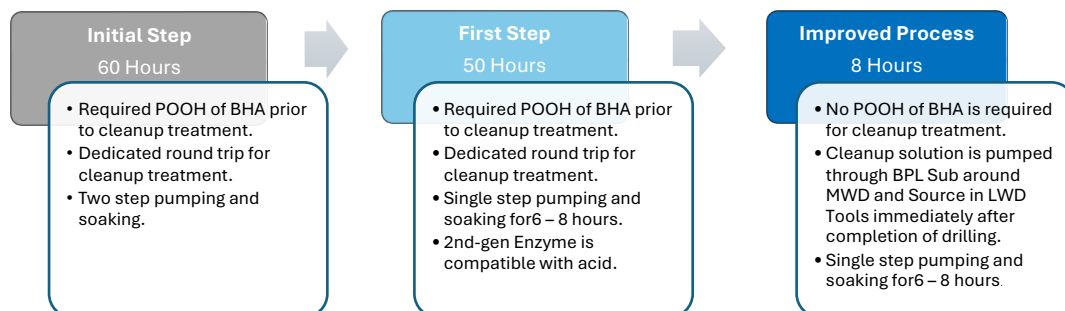


Figure 1—Biopolymer Filter cake on ceramic disc (A) and residual Filter cake after advance enzyme treatment (B).

RESULTS

During the study, the 2nd-generation enzyme system delivered exceptional results across 56 wells in Oman, establishing a new benchmark for wellbore cleanup efficiency.



- Rig time reduced by 87% — from 60 hours to 8 hours per well.
- Eliminated one full trip for cleanup, reducing operational exposure.
- 15–20% increase in well productivity observed across treated wells.
- Zero reported tool failures in MWD/LWD assemblies post-cleanup.
- Corrosion rates <4.3 MPY, well below industry limits.
- No fluid losses or HSE incidents during operations.

CONCLUSION

The PETROLIZE® enzymatic cleanup technology redefined wellbore cleanup for PDO by combining innovation, safety, and cost-effectiveness. The system proved capable of removing filter-cake residues in one step, ensuring full compatibility with complex downhole assemblies, and drastically reducing rig time.

This breakthrough demonstrates Epygen’s commitment to developing biochemical solutions for sustainable and efficient oilfield operations, reinforcing its leadership in next-generation wellbore cleanup technologies.

**This success is documented in SPE-226540, presented at the 2025 SPE/IATMI Asia Pacific Oil & Gas Conference and Exhibition*