

EXTENDING THE LIFE OF UNCONVENTIONAL ASSETS: STEP-PLEX™ THROUGH COIL IMPROVES THE ECONOMICS OF MILLING UNDER-PRESSURED WELLS

STEP-PLEX™ Diverting Agent:

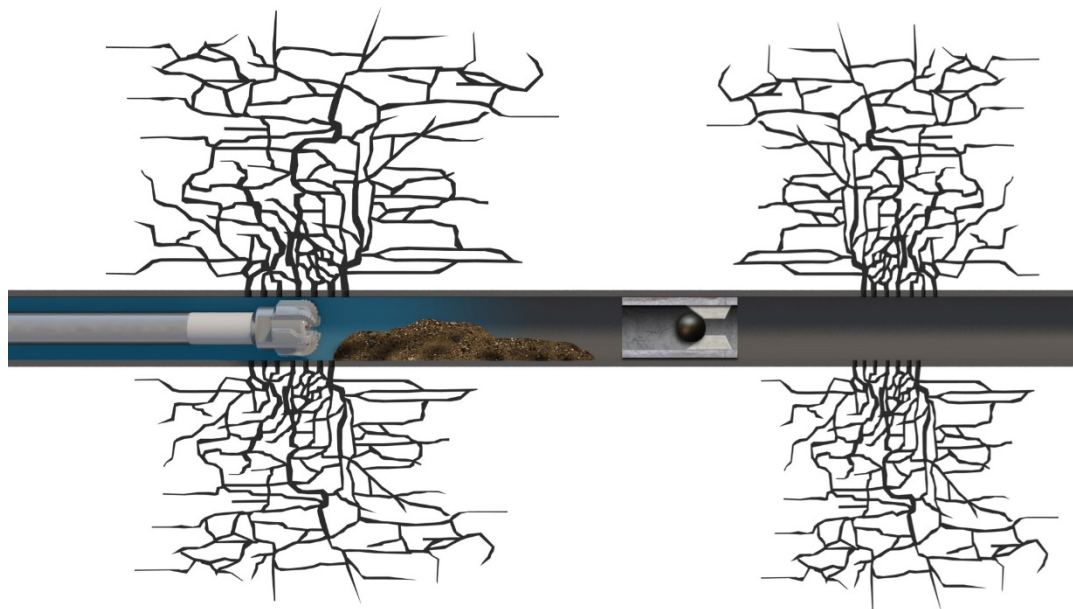
- Diverter technology was initially developed for fracturing and refracturing operations
- STEP-PLEX™ is also an effective far field diverter that temporarily blocks leakoff and maintains circulating pressures during coiled tubing milling or cleanout operations
- Products for wells ranging from 30°C to 120°C
- Can be pumped through mill and motor with no damage to the BHA (based on STEP recommended BHA package)
- All STEP coiled tubing equipment can integrate STEP-PLEX™

STEP Operations Example:

- Client's scope of work included milling to 4,200 meters
- Using STEP-PLEX™, the return-rate increased even as more potential leakoff points were exposed
- Reached 5,200 meters, unlocking 1,000 meters of new productive lateral
- Client benefited from an increase in production

In low bottomhole pressure (BHP) wells where maintaining circulation is challenging, STEP-PLEX™ can be pumped through coil and the bottomhole assembly (BHA) to temporarily isolate leakoff in the formation. The technology allows operators to reassess wells requiring a cleanout or millout where the economics and risk were previously unfavorable.

Challenge: To improve the production performance of a new or existing well, operators will perform a cleanout operation; milling with coiled tubing to remove any debris or obstructions thereby increasing production of the well. Fluid is pumped down the coiled tubing and returned up the annulus. In under-pressured formations, leakoff causes reduced or even lost circulation decreasing the success of the operation as debris is unable to return to surface.



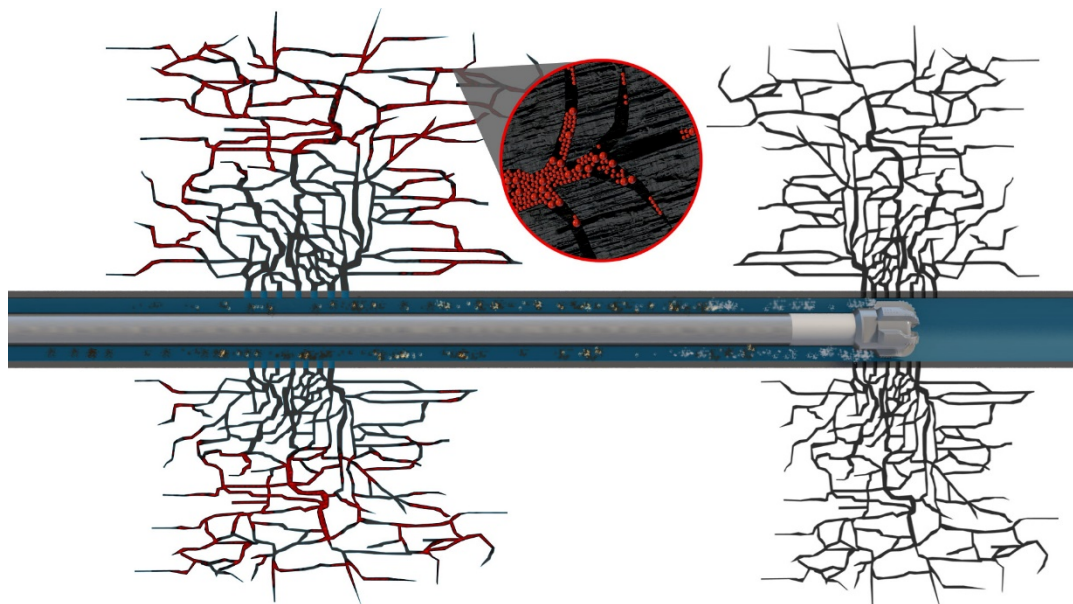
Under-pressured wells decreases success of milling operations

Operators have used other viable solutions to mitigate under-pressured wells:

- Multi-phase fluid (N₂) to reduce hydrostatic pressure
 - Expensive
 - Returns can still be lost
- Blind milling - push all debris through the sleeves, and to the toe
 - Possible formation damaging
 - Continuous fluid loss
 - Potential for stuck pipe

STEP-PLEX™ Solution: STEP’s diverting agent is a cost effective and efficient solution. By using STEP-PLEX™, operators can quickly, and temporarily, block leakoff to maintain or regain circulation, improving the ability to clean debris from the lateral.

- Reduce N₂ usage
- Reduce friction from debris
- Extend reach of coiled tubing and unlock potential production
- Reduce fluid loss
- Reduce NPT and stuck pipe risks



STEP-PLEX™ through coil temporarily blocks leakoff which increases pressure and circulation during milling operations

Lab testing supports that STEP-PLEX™ completely degrades without an accelerator within 24 hours to five days. Using an accelerator, dissolution times can be customized depending on reservoir temperatures.

Temperature	No Accelerator Solubility, %			50% Dissolution Time	100% Dissolution Time
	24 hours	48 hours	96 hours		
50°C	14	20	32	1.5 days	5 days
60°C	18	24	35	1 day	3 days
70°C	32	35	51	1 day	2 days
80°C	51	96	98	1 day	2 days
90°C	89	96	98	8 hours	24 hours

Based on two bags diversion pills (in water or brine)