MicroPlug™ Case History	Pipe Recovery	
Document Number	Approver Position	TENAX Energy Solutions Ops Mgr
McPPR000008	Approver Name	Brandon Easter

Days stuck in well: 3
Location: Weld/CO
Stuck Depth: 13,096'
TVD @ Stuck Depth: 6,241'

Scope of Work:

Free coiled tubing stuck during a composite frac plug millout.

Background:

Workstring: 2.375" / 0.224" - 0.145" wall / QT1000
TENAX tools: MicroPlug PR
Max Rate: 9bbls/min @ 1400psi

Perforation Information

Gun Info: 2.875" OD guns w/60° phasing
Shots: 6spf / 18g RDX charge
0.36" EHD / 14.2" Penetration
Perforations to BHA: 864
Regimen: 15 MicroPlugs every 20bbls fluid
Completion Specifics:

- 5.5" 20lb P110
- 90° @ 10,920'
- PBTD @ 17,957'
- BHT - 221°
- BHP - 1,000psi

SITP: 950psi
SICP: 820psi
Immediate Concerns: Plug parts not coming back with returns | stuck tubing while picking up off bottom | 360,000scf N_2 pumped down the annulus to no avail

Initially, the operating company was picking up off of plug #40 when they became stuck. The upward movement stopped just below plug #24 at 13,096ft. At this juncture, the call was made to pump N2 down the coiled tubing, which produced less than a coffee can worth of plug parts. Next, the call was made to utilize MicroPlug Pipe Recovery methods to free the coiled tubing, due to the loss of returns and open perforations above the BHA.

Treatment:

The first 100bbls were pumped down were pumped down starting at 4.5bbls/min and going up to 9bbls/min at 1,400psi. Once the rate was stabilized on a pressure graph and the CT string put in neutral weight, 15 MicroPlugs were dropped for every 20bbls of fluid pumped. Over the course of the treatment, the CT annulus pressure went from 1,400psi to 2,650psi, or roughly 20psi/per drop. After 200 MicroPlugs were pumped, an attempt was made to move the coiled tubing, to no success. After 600 MicroPlugs were pumped away, the call was made to pump 650,000scf of N2 down the annulus to charge the formation while also creating a differential pressure potential force zone. The N2 was bullheaded at 1,800scf/min while flowback was set up to dump the annulus. After the pumping was complete, a pressure dump was conducted, but the coiled tubing would still not move. Next the fluid pump was crippled for circulating down the CT. The plug catcher manifold was periodically inspected and found to be getting both sand and plug parts for the first time in a few days. MicroPlugs started showing up in the returns about an hour before the coiled tubing gained back all of their weight. Around 17:45 that day the coiled tubing was pulled up and became free uphole as well. It was then POOH with consistent unloading of sand, plug parts, and MicroPlugs. With less than a day invested in the MicroPlug solution, the money saved by this string recovery versus well conditions was estimated at $1.36 million, counting fishing operations, NPT, and lost production.