

Overview of Post-Stim Operations

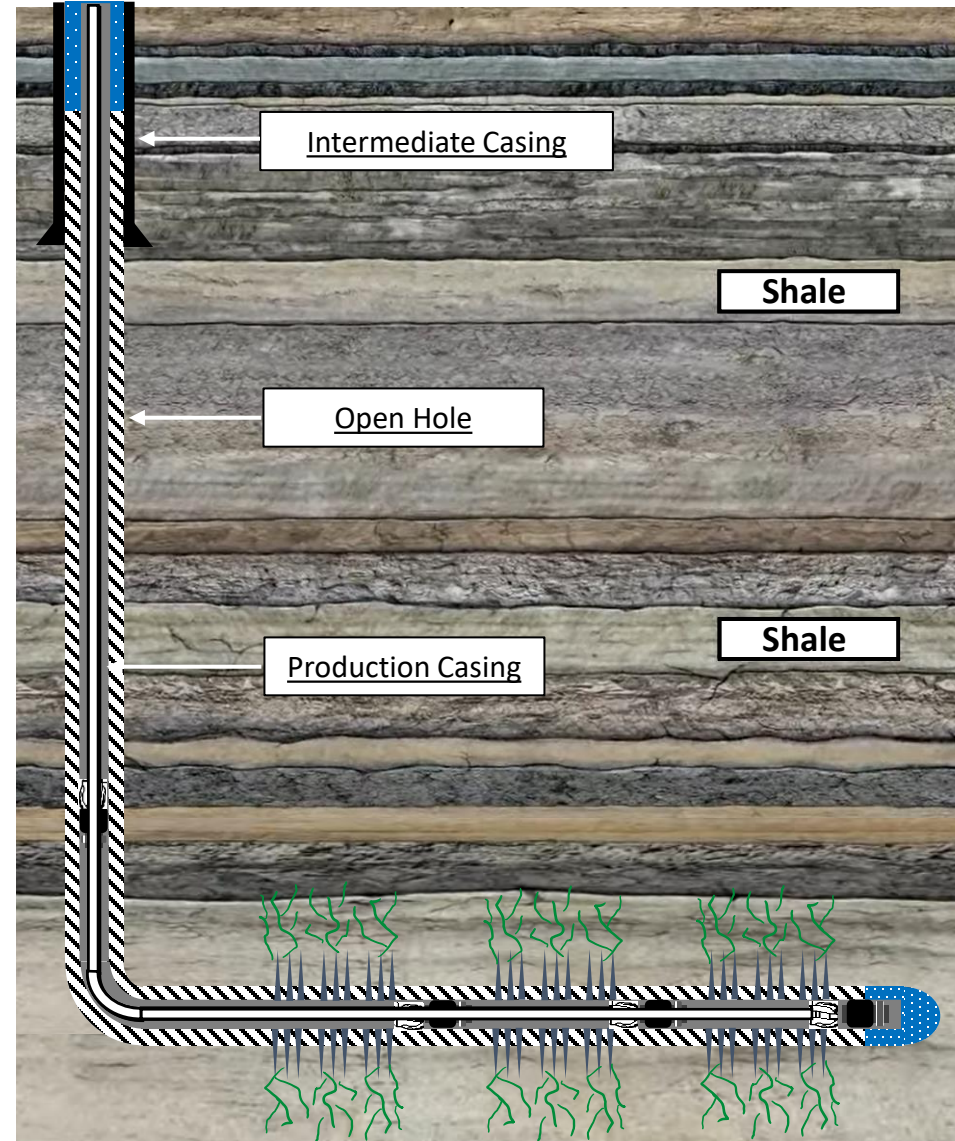
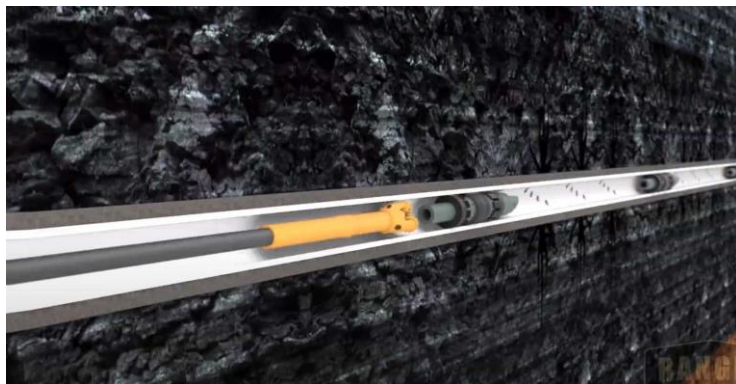
- **General Purpose/ Overview**
 - Drillout frac plugs used during plug-and-perf stimulation operations & clean out wellbore for well production



Horizontal Completion: Drillout Operations

Post-Stim Operations

- Setup and Rigup Equipment
- Drillout plugs on all wells
 - TIH with bit and workstring
 - Drillout plug & trip to next plug (repeat each plug in the well)
 - Circulate clean as needed to keep a clean wellbore
 - TOOH
- Install Production Equipment
- RDMO & ToP (turn over to production)



Drillout Phase

- TIH
- Drillout plug
- R/H to next plug
- Repeat
- TOOH

RR - Rig Release
TOP - Turn over to Production
TIH - Trip in Hole
TOOH - Trip out of Hole
CBP - Composite Bridge Plug
RDMO - Rig Down Move Off
PnP - Plug and Perf

Drillout Operations – Low Pressure Drillouts

- Drillouts are considered low pressure when drilling out depleted or under pressure reservoirs
 - During drillout operations a well is considered low pressure if pump rate does not equal return rate
 - Example: Pumping 4 BPM down the workstring/BHA and returning less than 4 BPM up the annulus (utilizing freshwater)
 - In extreme cases/depleted reservoirs pump rates could be 4 BPM and return rates could be 0 – 1.0 BPM, this would result in the need to alter fluid systems (next slide)
- Low pressure drillouts could result in inefficient hole cleaning or stuck pipe events

Low Pressure Drillout Strategies Over Time



Salt System

- Divert perfs
- Increase hydrostatic
- Expensive
- Potential production inhibition



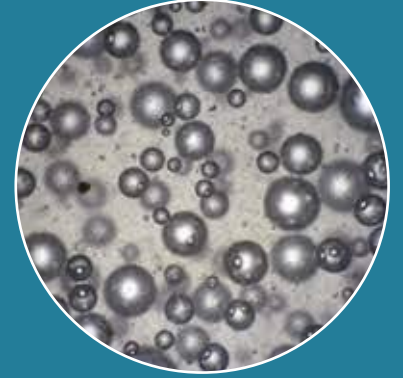
Nitrogen

- Reduce hydrostatic increasing returns
- Potential increased costs
- Operationally complex



Freshwater w/ Diverter

- Divert near wellbore
- Inconsistent performance
- Operationally complex



Fluid Lightening System (FLS)

- Bubbles divert near wellbore
- Reduce hydrostatic in vertical section
- Increased sand carrying capacity



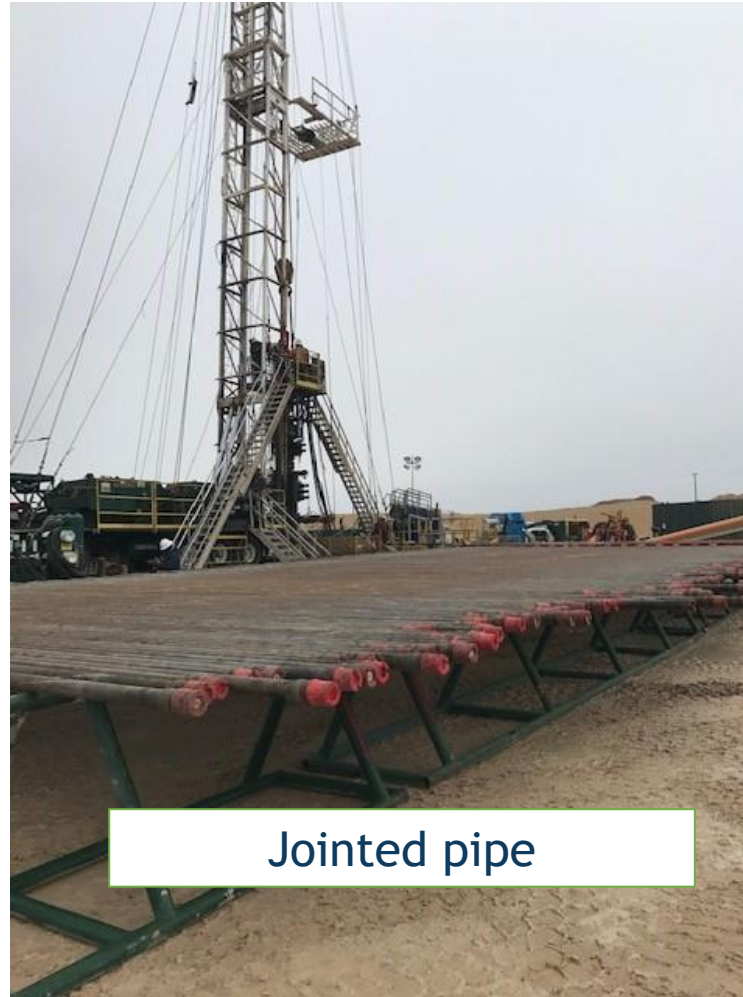
Drillouts – Location setup

Basic fluid path on location:

- WORKING TANKS/MIXING PLANT
- REVERSE PUMPS
- KELLY HOSE/POWER SWIVEL
- WORKSTRING (PIPE)
- BIT
- CIRCULATION UP ANNULUS
- FLOWBACK
- SAND REMOVAL
- RECYCLED BACK TO WORKING TANKS



Workover Rigs – BHA / Workstring



Removal / Drilled Frac Plug Parts

