

Recommended Procedures

Recommended Coiled Tubing Drilling/Milling Procedures For The Mill-EZ™ Composite Plugs

The following Bottom Hole Assembly is recommended to remove the Mill-EZ™ Composite Bridge Plug/Flow-Back Plug.

- 6 Bladed Magnum Mill (95-98% of Drift Diameter)
- Hi Torque Mud Motor
- Hydraulic Disconnect
- Dual Back Pressure Valve
- Coiled Tubing Connector
- Enough Coil Tubing to reach bottom of well

The following is a recommended drilling/milling procedure for removing and eliminating one or multiple Mill-EZ™ Composite Bridge Plugs from the well bore. Check to ensure all equipment is compatible and all running procedures are well within manufactures recommended guidelines.

1. Move in Coiled Tubing Equipment (It is recommended to have a Double Pump Truck spot the equipment).
2. Have a safety briefing to cover the rig up procedures
3. Rig up Coiled Tubing Equipment and enough lubricator to cover the bottom hole assembly, motor and the Magnum Mill.
4. Function test the BOP's with the coiled tubing crew.
5. Run Coil Tubing through the coiled tubing stack until pipe comes out of the lubricator.
6. Mic the coiled tubing to ensure the correct O.D. and no egg-shaping of the coiled tubing.
7. Straighten the coil and cut the bottom of the coil off. File the flared end of the coil to bevel the end of it. (This helps from cutting o-rings and damaging slips when making up the coil).
8. Make up the coil connector with a pull tester plate. Pull test the coil connector to manufactures recommended pull weight. **NOTE: When pull testing the coil connector measure off the hydraulics, then compare it to the weight indicator to adjust the weight indicator if it is off.**
9. Run the coil out of the lubricator and check the make on the coil. Retighten the coil connector and make up the set screws.
10. Load and circulate the coiled tubing with fluid until the fluid comes out clean. **NOTE: Recommended to run in line filter with a screen.**
11. Make up the dual back pressure valve, hydraulic release, and hi-torque motor with the Magnum Mill. Test the motor at surface by drilling a test hole.
12. Rig up on the well and test.
13. Run in the hole, pumping through the motor at the minimum rate checking pick up and run in weights.
14. Approximately 1,000' before the perfs bring the pump rate up on the motor to the manufactures recommended rate (approx 400 to 600 rpm).
15. Pump a dyed gel sweep.
16. Approximately 100' before the perfs depth establish the flow rate in the return tank. The optimum rate is bbl in bbl out. **NOTE: The bbl for bbl rate will also depend on the pressures below the plug from the pressures from the open perfs. This will determine on how much back pressure to hold. If there is a possibility of drilling through higher a differential (after running the coil through the perfs, while staying off the plug) it would be necessary to clean out the well bore before drilling out the plug, this will eliminate the possibilities of sticking the coil.**
17. After the rates and wellbore differentials are stable, run in the hole no more than 5 ft/min. watching the weight indicator. When you see about 200lbs to 500lbs of weight loss, let the coiled unit creep in the hole about .1 to .3 ft/min. watching for any pump pressure increases or continuation of weight loss. (No more than 1,000lbs). Once you see the pump pressure increase 100lbs to 300lbs differential, set the brake to gain weight back to normal pump pressure. Release brake continuing the milling operations until string weight and pump pressure is regained (if you are taking a gas kick, it is recommended to pick up above the perfs and circulate the well until the pump rate and wellhead pressure is maintained and the weight on the coil is ok).
18. After the plug has been milled through, pump 10bbl gel sweep with dye pumping 5bbl gel and 5bbl KCL water, then 5bbl gel and continue to the desired depth.
19. For multiple plugs, continue drill-out procedures form step 14 **NOTE: Each stage will have different bottom hole pressures which will determine on what needs to be held on the backside. Pumping gel sweeps before and after drilling the plug and circulating well clean before each stage will help from sticking the coiled tubing.**

NOTE: It is preferred to take a less aggressive approach and mill or grind the plug into small pieces to minimize debris size for particle managing reason.

Recommended Tubing Drilling Procedures For The Mill-EZ™ Composite Plugs

The following Bottom Hole Assembly is recommended to remove the Mill-EZ™ Composite Bridge Plug/Flow-Back Plug.

- 6 Bladed Magnum Mill (95-98% of Drift Diameter)
- Bit Sub or Pump-Off Bit Sub
- Power Swivel
- Enough Tubing to reach bottom of well

The following is a recommended drilling procedure for removing and eliminating Mill-EZ™ Composite Bridge Plugs from the well bore. Check to ensure all equipment is compatible and all running procedures are well within manufactures recommended guidelines.

1. Rig up bit sub and bit/mill to end of tubing.
2. Run assembly to bottom and tag cement or Mill-EZ™ lightly.
3. Pick up 4-6 feet off Mill-EZ™ or cement.
4. Keep the pressure and pump rate approximately 120-150 ft/min annular flow, Approx 2 bbls/min.
5. Start turning power swivel and bring tubing 75-125 rpm.
6. Slowly lower bit assembly into hole until pump pressure increased or set down weight decreases.
7. Begin feathering the plug for the first few minutes to mill up the upper portion of the mandrel.
8. While drilling note any increase in pressure from the well due to the plug equalizing.
9. Pick up drill assembly to circulate the debris off the top of the plug.
10. Proceed to feathering the plug for the first few minutes.
11. Set approximately 2000lbs of tubing weight on the cement or plug.
12. After drilling out the upper portion of the plug, and allow lower zone to equalize and in order to continue milling the plug.

13. Drill thru upper slips, center of plug, and lower slip section.
14. Continue drilling operation until string weight and pump pressure is regained.
15. Chase the bottom of the Mill-EZ™ to the bottom of the well.
16. Shut down the pump.
17. For multiple plugs return to step 7 before shutting down the pump.
18. The bottom section of the first plug will increase your drill time ever so slightly.

NOTE: It is preferred to drill or grind the plug into small pieces to minimize debris size for particle managing reason.