



PLUG REMOVAL PRACTICES

Bit Selection

A quality built tri-cone bit will give you the best performance in low sand environments and plug counts of up to 15-20 plugs in most cases. For quantities above and beyond this 15-20, you should be prepared for a bit change if times begin to consistently get longer.



Quality built non-aggressive reverse style bladed junk mills offer the best performance if a mill is preferred or if there is a high sand environment. The non-aggressive style helps to minimize motor stalls and keep cuttings consistent. PDC bits also work very well in all applications.

All bits/mills should have a minimum shank length of 4 inches with a fishable diameter within the tubing being used. For mills, make sure there is one blade that extends across the face approximately 70% to minimize coring of the plug.

Recommended OD of the bit/mill is at least 90% of the casing ID. Going any smaller on the OD can greatly increase the possibility of sticking pipe or coring the plug.

Jointed Pipe

On a bit release sub or a standard bit sub, make up the correct size bit/mill. A bit/mill running 92-95% of casing drift diameter provides the quickest drill time in normal reverse unit or snubbing operations. If drilling under balance, ensure a float is installed in the bit sub.

Use of drill collars for weight and centralization is recommended.

Run in hole with the drill assembly to a depth approximately 30-35' above the plug, pick up the power swivel and make up circulating equipment. If conventional circulation and under balance are used, ensure a screen is installed in the pump line to prevent debris from being pumped down and clogging up the bit. Ensure circulation to the bit has been established before moving down to the plug.



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Start Rotation to the power swivel and make sure torque is properly set to the recommended range of 50-150 RPM. If operating in deviated wells, a lower range of 60-80 RPM's may be all that is available due to the increased drag and torque. Keeping safety in mind and rotate the pipe as fast as torque and weight limits will allow.

Once rotation and circulation are established, lower tubing slowly to contact the plug. A pump rate of .5 – 3 bbl/m is recommended if returns are possible. A junk basket is recommended to prevent large cuttings from settling on the plug during drilling if circulation cannot be achieved. Maintain approximately 1000 – 4000lb weight on bit. If swivel stalls pick up on tubing to allow the tubing to rotate freely, lower the tubing and engage the plug again. Repeat these steps until the composite plug is drilled and the tubing can be lowered without turning the swivel. Drill rates will vary per weight on bit, circulation rates, velocity around the bit, or bit tracking. If torque reading indicates bit tracking, raising and lowering the pipe while rotating will change the cutting area.

When the bit reaches the rubber elements a decrease in weight on bit may be needed to reduce excessive torque. This will allow the element to be drilled into smaller cutting instead of being torn into large pieces.

If multiple plugs are being drilled, allow circulations of at least one tubing volume after drill out of each plug before beginning drill out of the next plug. This will allow for bit clean up and ensure fluid mixture is at bit before continuing drilling operations. After drill up of a plug, move up hole 30 – 100' and use a gel sweep to circulate debris from bit and wellbore.

Coiled Tubing

Motor RPM should be in the 250 – 600 range based on motor size although the motor company should be consulted on all topics regarding motor speed.

Weight on bit should be between 1500 – 3000lb and the flow rate should be between 2 – 3 bbl/m depending on motor size. The weight on bit should only be increased if rotation starts to occur.

Establish flow rate before contacting the plug start milling using minimum to mid-range flow rate. Higher flow rates tend to hydraulically lift the milling assembly off of the plug. More weight on bit can correct this. The weight on bit will fluctuate so try to keep differential pressure consistent.

If plug stops milling at a consistent rate, pick up off of plug and set back down weight to establish a new cutting pattern on the plug. Continue slowly through the first twelve inches to allow the pressure to equalize. There may be a drastic pressure differential above and below the plug.

When drilling multiple plugs, circulate at least the volume of tubing between plugs to allow clean up and establish good fluid at the bit before drilling the next plug.