

TROUBLE-SHOOTING CHARTS

These trouble-shooting charts offer assistance in solving common motor problems that may develop. They are not intended as a substitute for experienced supervision.

MOTOR AND BIT OFF BOTTOM

CIRCULATING PRESSURE	POSSIBLE CAUSE	REMEDY
Decrease in circulating pressure (lower than expected)	Lost circulation	Follow lost circulation procedures
	Drill-string washout	Pull out of hole. Check string.
	Open dump valve (If equipped)	Stop pumps. Restart using increased flow
Increase in circulating pressure (higher than expected)	Plugged motor or bit	Stop pumps. Restart pumps and vary flow rates. Reciprocate string.
	Bit side-loading	Drill ahead carefully to relax tool assembly.

DRILLING WITH MOTOR AND ROTARY

ROP	SPP	WOB	ROTARY TORQUE	POSSIBLE CAUSE	REMEDY
Falls	Falls	Normal	Falls	Harder formation	Optimize ROP. Continue drilling
			Rises	Stabilizers reaming	Continue with caution. If unsatisfactory, pull bit
	Rises	Normal	Falls	Bit Balling	Lift off bottom, reciprocate. Wash away balling material
				Bit is wearing	Calculate cost/foot and either continue drilling or pull bit
			Rises	Motor Stall	Immediately stop pumps, pull off bottom, restart cautiously
				Bearings locked	Lift off bottom, check pressure, try to drill off without rotary
	Fluctuates	Normal	Fluctuates	Junk in hole Bit cones locking	Attempt to wash away junk. Fish if necessary
	Normal	Rises	Normal	Normal	String wash out
Rises		Normal	Normal	Plugged motor or bit	Stop pumps. Restart, vary pressure, reciprocate string
Rises	Rises	Normal	Rises	Softer formation	Optimize ROP-Continue drilling

ROP=Rate of Penetration SPP=Stand Pipe Pressure WOB=Weight on Bit

DRILLING WITH MOTOR ONLY (NO ROTARY)

FIRST INDICATOR	SECOND INDICATOR	POSSIBLE CAUSE	REMEDY
No ROP	SPP Higher than Maximum	Motor Stall	Stop pumps, pull off Bottom, add WOB carefully to restart
SPP Rises Higher than Maximum	No ROP	Motor Stall	Stop pumps, pull off Bottom, add WOB carefully to restart
Decrease in ROP	SPP Rises, WOB Normal	Broken or worn bit cutters. Bit ringing	Calculate cost/foot and either continue drilling or pull bit
	SPP Falls, WOB Normal	Hard formation or stabilizer hanging up	Continue with caution. If unsatisfactory, pull bit
	SPP Rises, Falls to respond to increase WOB	Bit Balling	Lift off bottom, reciprocate. Wash away balling material
	Slow fall in SPP	Bit is Wearing	Calculate cost/foot and either continue drilling or pull bit
	SPP Fluctuates	Assembly bouncing junk in the hole	Attempt to wash away Junk. Fish if necessary
Sudden Increase in ROP	SPP Rises, WOB Normal	Softer formation	Pull off Bottom, recalculate angular reactive torque. Continue drilling using recalculated parameters.
	Toolface heading (TFH0 Turns to the Left	Softer formation	Pull off Bottom, recalculate angular reactive torque. Continue drilling using recalculated parameters.

ROP=Rate of Penetration SPP=Stand Pipe Pressure WOB=Weight on Bit

MOTOR STALL

A large increase in SPA occurs, drilling stops and the drilling mud bypasses the rotor/stator seal. If drilling with rotary, the drill string continues to turn while the rotor stops. This causes the same effect as if the stator were spinning backwards. Should this happen, immediately drop the pump. Continue the rotary table and allow the pressure to bleed off. Stop the rotary table and slowly lift off bottom to release the trapped torque. Use the rotary table clutch to slow down the unwinding of the drill string to keep from backing off a connection. If SPP reading is the same as it was before the stall occurred, when off bottom, resume drilling.

MOTOR DOS & DONTS

DO
<ul style="list-style-type: none"> Run light WOB during initial drilling to establish a cutting pattern for the bit to follow. Relieve motor torque before making a connection to eliminate connection back off up the string. Make sure pumps are running at full stroke before tagging bottom on connections. Change weight and or rotary speed if SPP is spiking badly.

DO NOT
<ul style="list-style-type: none"> Run motor at stall pressure for an extended time. Ream with a motor for over 20 hours. Allow the bit to bounce on bottom. Run abrasive LCM such as walnut hulls. Allow pumps to stop circulating until LCM has travelled completely through the system and over the shakers to alleviate the risk of plugging the power section.