

# **KILL PROCEDURES**

## **Driller's Method**

**1st Circulation :** Circulate Out Kick With Original Weight Mud.

1. Open choke, bring pump up to kill speed while maintaining constant casing pressure (or kill line constant with a Subsea Stack)
2. With the pump at kill speed, having allowed for the time lag, switch to drill pipe pressure, maintain constant ICP on the drill pipe by manipulating choke.
3. After kick is circulated out, close-in well while maintaining constant casing pressure (or kill line constant with a Subsea Stack).
4. When the well is totally closed-in, SICP must be same as original SIDPP. If not, resume circulation until all the influx is circulated out.

**2<sup>nd</sup> Circulation:** Displace Original Mud With Kill Weight Mud.

**1<sup>st</sup> Part - Pumping Kill Mud Weight from Surface to Bit.**

5. Reset stroke counter, open choke, bring pump up to kill speed while maintaining constant casing pressure. Re-zero counter when surface lines have been displaced.
6. (If all the influx is out) Maintain constant casing pressure until the heavy mud reaches the bit or follow a DP Pressure Step Down. At this point DP pressure will be at FCP.
7. The Supervisor may choose to stop pumping to check that the kill mud is heavy enough to overbalance formation pressure. With pumps off and no safety pressure i.e. SIDPP = zero and SICP = Initial SIDPP.

**2<sup>nd</sup> Part – Pumping Kill Mud Weight from Bit to Surface.**

8. Restart pumps holding Casing or Kill Line constant then continue pumping while maintaining constant FCP on the drill pipe until the heavy mud reaches the surface.
9. Stop pump. Check for flow.

## **2. Wait & Weight Method**

**One Complete Circulation:** Circulate Out Kick with Kill Weight Mud.

1. Open choke, bring pump up to kill speed while maintaining constant casing pressure.
2. Follow DP Press vs. Pump Strokes schedule to adjust DP pressure as kill weight mud travels to the bit.
3. When the heavy mud is at the bit, stay with DP pressure and maintain constant FCP on the DP until the kick is expelled and the heavy mud reaches the surface.
4. Stop pump, check for flow.

## **Concurrent (Gradual Weight-Up) Method**

Circulate Out Kick While Gradually Increasing Mud Weight. (Same as Wait & Weight Method except you will follow DP pressure vs. Mud Weight schedule as you weight-up your mud.) Only used insufficient weighting material is at rig site/

METHODS	ADVANTAGES	DISADVANTAGES
<b>DRILLER'S METHOD</b>	<ol style="list-style-type: none"> <li>1. Simplest to teach.</li> <li>2. Very few calculations pressure with gas kick.</li> <li>3. In case of salt water, the influx is moved out quickly to prevent sand setting around drill string.</li> <li>4. Gas has no time to migrate.</li> </ol>	<ol style="list-style-type: none"> <li>1. Higher casing shoe.</li> <li>2. Higher Annular pressure.</li> <li>3. Takes 2 circulations</li> <li>4. Too much on choke time</li> <li>5. More chances of L.C.</li> </ol>
<b>WAIT &amp; WEIGHT METHOD</b>	<ol style="list-style-type: none"> <li>1. Lowest casing pressure.</li> <li>2. Lowest casing shoe press (time) less strain on BOP's.</li> <li>3. Less loss circulation (if not overkilled).</li> <li>4. Killed with on circ.</li> <li>5. Less time on choke.</li> </ol>	<ol style="list-style-type: none"> <li>1. Requires time to mix mud.</li> <li>2. Pipe could stick due to settling of sand, shale or salt while not circulating.</li> <li>3. Requires a little more arithmetic.</li> <li>4. Requires barite.</li> <li>5. Gas could migrate</li> </ol>
<b>CONCURRENT METHOD</b>	<ol style="list-style-type: none"> <li>1. Minimum of non-circ time.</li> <li>2. Excellent for large increases in mud weight.</li> <li>3. Mud condition can be maintained along with mud weight.</li> <li>4. Less casing pressure than Driller's Method.</li> <li>5. Can be easily switched to Walt &amp; Weight.</li> </ol>	<ol style="list-style-type: none"> <li>1. Arithmetic is little more complicated.</li> <li>2. Requires more on choke circulating time.</li> <li>3. Higher casing and casing shoe pressure than W. &amp; W.</li> </ol>

**MECHANICAL AND HOLE PROBLEMS**

Table 1

D/PIPE PRESSURE	CASING PRESSURE	ACTION TO TAKE	RESULT	PROBLEM	SOLUTION
Up	Up about the same amount as drill-pipe pressure	Check pump rate	Pump rate is too fast	Circulating pressure is too high because the pump is running faster than was planned	Slow the pump rate down to the planned rate. If pressures come down, everything is OK. If not, continue down chart
		Increase choke size	Drill-pipe pressure and casing pressure came down	Choke size was too small	If the pressures come down when the choke size was increased - everything is OK. If not, continue down chart
		Open choke all the way	Drill-pipe pressure and casing pressure came down	Either choke size was too small or the choke was trying to plug up	If pressures come down, everything is OK- if not, continue down chart
		Stop the pump	Drill-pipe and casing pressure came down	The choke manifold has started to plug up	Switch to the alternate choke line and clear the manifold. If the pressures do not come down, continue down chart
		Shut the well in	Pressures stay up	Manifold is plugged	Switch to alternate choke line, if pressures come down, go back to well killing, if not continue down chart
				Manifold is plugged at or above the "T"	Close the master valve on the kill line, release the pressure from the manifold and clean it out
Up	Up, but not very much	Check pump rate	Pump rate too fast	Circulating pressure is too high because the pump rate is faster than planned	Slow the pump to the planned rate. If pressures come down, OK. If not, continue down chart
		Increase choke size	Drill-pipe and casing pressure came down	Choke size was too small	If the pressures come down-OK. If not continue down chart
			Casing pressure comes down, but not drill-pipe pressure	WAIT at least 2 min to see if there is a long lag between choke movement and drill-pipe pressure	Allow for a long time lag with big gas kicks. If pressure does not come down, continue down chart
			Drill-pipe pressure does not come down	A mud ring or pack off near the bit	Raise or reciprocate the drill-pipe. If drill-pipe pressure comes down, OK. If not, continue down chart
				Plugged jet	Restore casing pressure to where it was before the trouble started. Take the changed drill-pipe pressure as the new constant circulating pressure OR: Stop the pump and shut the well in, and bleed the pressure off the drill-pipe. Then start up holding casing pressure constant until you reach a new pump rate. Then use the new circulating pressure as the new constant circulating pressure
Up	No change	Check pump rate	Pump rate too fast	Circulating pressure too high because rate is faster than planned	Slow the pump to the planned rate. If the pressure comes down, OK. If not, continue down chart
		Increase choke size	Casing pressure gets very low before drill-pipe pressure comes down	A mud ring or pack off near the bit	Raise or reciprocate the drill-pipe. If drill-pipe pressure comes down, OK. If not, continue down chart

Table 2

<b>MECHANICAL AND HOLE PROBLEMS</b>					
<b>D/PIPE PRESSURE</b>	<b>CASING PRESSURE</b>	<b>ACTION TO TAKE</b>	<b>RESULT</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
Up abrupt change	No change	Increase choke size	Casing pressure gets very low before drill-pipe pressure comes down	Plugged bit	Either, Take the new drill-pipe pressure as the constant circulating pressure Or: Stop the pump and shut the well in and bleed of the drill-pipe pressure. Then start up holding casing pressure constant, until you reach a new pump rate. Then use the new circulating pressure as the constant circulating pressure
		Open choke	Drill-pipe pressure does not come down	Plugged bit	Stop the pump and shut the well in. Try "rocking" the pump to clear the bit. You may have to shoot off or back off the bit
				On a marine rig with sub-sea wellhead and riser a possible plugged wellhead or riser kill line	
No change	Down or no change	Increase or decrease in choke size	Pressures do not seem to respond to choke movement	Lost circulation, bad cement job, or a hole in the casing. Check pit volume	<ul style="list-style-type: none"> <li>• Pick a new slower circulating rate</li> <li>• Add lost circulation material</li> <li>• Drop a barite plug</li> </ul>
		Check pit volume	Volume OK	Check the choke for failure	Switch to alternate choke
Down	Down	Check pump rate	Pump rate too slow	Circulating pressure too low because the pump is running slower than was planned	Increase the pump rate to the planned rate. If pressures come up, OK - if not, continue down chart
		Decrease choke size	Drill-pipe and casing pressure came up	Choke size was too large	If pressures go up when choke size was decreased, OK-if not, continue down chart
			No change in drill-pipe and casing pressure	Lost circulation, bad cement job, or a hole in the casing. Check pit volume	See "drill-pipe pressure - no change"
Down	No change	Check pump rate	Pump rate too slow	Circulating pressure is too low because the pump is running slower than was planned	Increase the pump rate to the planned rate. If pressures come up, OK. If not, continue down chart
		Decrease choke size	Pressures increase	Choke size was too large	If pressures go up when the choke size is decreased, OK. If not continue down chart
			Pressures increase but kelly hose jumps and drill-pipe pressure surges	Pump trouble	change pumps or repair pump
		Continually decreasing choke size	Drill-pipe pressure stays the same, casing pressure goes up	Hole in the drill-pipe	Stop the pump and shut the well in. You may have to strip out to replace a joint of pipe
Abrupt change down	No change	Decrease choke size	Drill-pipe and casing pressure go up	Washout on bit or drill-pipe	