Cheatography

MPD (Managed Pressure Drilling) Cheat Sheet

by Tito (tito.vinicius) via cheatography.com/147214/cs/32214/

Standard

API RP 92S	Managed Pressure Drilling Operations-Surface Back-pressure with a Subsea Blowout Preventer
API RP 92P	- Managed Pressure Drilling Operations - Pressurized Mud Cap Drilling with a Subsea Blowout Preventer

Drilling Methods

Convencional Drilling	**Zone of Low Pressure** is encountered
	Drilling mud is higher than the formation pressure and it's begins to enter existing fractures and vugs
	Second **Zone of Low Pressure** is encountered
	Again, **Mud Weight** exceeds formation pressure and fluid losses begin
	The loss of fluid reduces the hydrostatic pressure and when it's lower than the formation pressure **gas enter the wellbore** and **causes the kick**
MPD Drilling	MPD is **Adaptative drilling process used to precisely control the annular pressure profile** throughout the wellbore
	The intention of MPD is **to avoid continuos influx**
	Any influx incidental to the operation will be **safely contained**

When and why to use MPD?

- Drill conventionally “Un-drillable” tight Pore/Collapse/Fracture pressure gradients;
- Drill to target depth in wells with high in-situ stresses;
- Wells with rapid-change in pore pressure regimes, abnormal pressure regimes;
- Increase **ROP** drilling closer to balanced condition; **ROP stands for “Rate of Penetration,” which is basically how fast the bit is drilling the hole**
- Reduce number of loss/kick occurrences;
- Reduce time spent dealing with well control events;
- Detect and manage kicks/losses earlier;
- Differentiate Kick from Ballooning;
- Reduce pressure cycles that cause fatigue-related borehole instability;
- Reduce open hole exposure-time induced borehole instability;
- Reduce mud costs;
- Set casing deeper;
- Optimize number of casing strings;
- Trip safely;
- Remove H2S hazard from rig floor;
- Drill **HPHT** wells safely. **The term HPHT is typically used to describe high-temperature, high-pressure wells that are at either a higher temperature or pressure than most other oil wells – usually over 150°C and 10,000psi at their deepest point**

MPD Techniques

Constant Bottom Hole Pressure (CBHP)	Constant bottomhole pressure MPD **reduces NPT (Non-Productive Time) and enable drilling when pore- to fracture-pressure gradient windows are narrow**
Pressurized Mud Cap Drilling (PMCD)	Pressurized Mud Cap Drilling MPD **enables drilling in extreme-loss situations**

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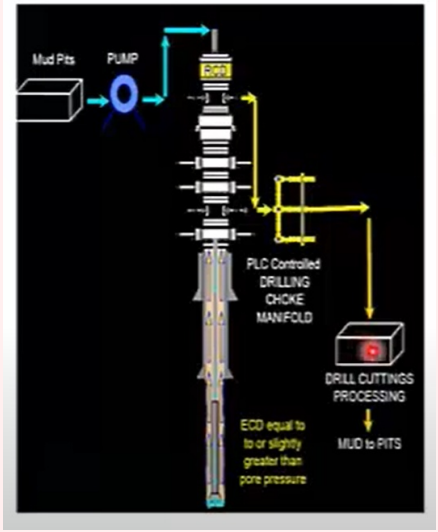
MPD Techniques (cont)

Dual Gradient Drilling (DGD)	Dual Gradient Drilling MPD **enable total well depth in the right hole size in deep-well and deepwater drilling**
Return Flow Drilling (RFC)	Return Flow Drilling MPD **reduces to risk to personnel and the environment from drilling fluids and well control incidents**

How to Control the Annular Pressure?

Rotating Control Device (RCD)	Rotating control devices are **the first line of defense against fluid loss** during critical operations. **Use to isolate the wellbore**
Chock Manifold	Apply the pressure
Coriolis Flow Meter	Flow measurement
MPD System Control	System control

Equipment Flow Diagram



Equipment Flow Diagram Explanation

The flow diagram shows MPD flow path in its simplest form.

Mud is **pumped from the mud pits** via the rig pump.

The rig pump delivers flow to the stanpipe then into the Top Drive and down the drill string

Return flow comes up via the annulus and exits via a take off point below the RCD known as the flow spool.

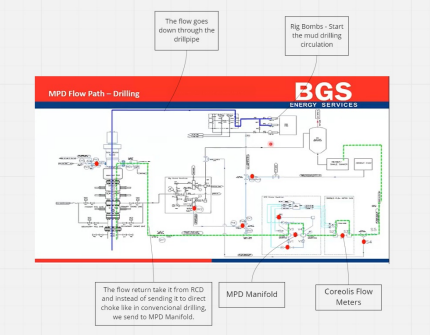
The RCD seals the wellbore whilst allowing the deployment and retrival of drill pipe into the well bore.

From the flow spool pipe work connect to the MPD Manifold fitted with the PLC controlled chokes or pressure control valves and the flow meters.

Flow exits the MPD manifold and returns to the rigs mud pits after removal of the drilled cuttings.

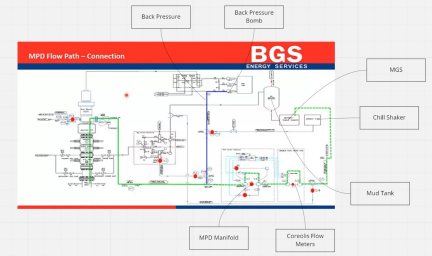
If used a MGS Mud gas separator sits directly after the MPD manifold and removes gas to a safe vent. Without a MGS gas is likely to break out at the rigs shakers or muds pits.

MPD Flow Path - Drilling

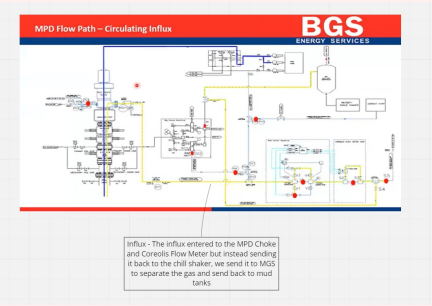


1 - Rig Bombs start the mud drilling circulation;
2 - The flow goes down through the drillpipe;
3 - The flow return take it from RCD and instead of sending it to direct choke, like in convencional drilling, we send to MPD Manifold;
4 - MPD Manifold;
5 - Coreolis Flow Meters.

MPD Flow Path - Connections



MPD Flow Path - Circulating Influx



MPD Flow Path - Conventional Well Control