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DRILLING TECHNIQUES

A successful well drilling, whether on land or offshore, must be able to provide;

- 1- a means of fracturing and penetrating through rock formations to reach petroleum and gas,
- 2- a means of excavating the rock cuttings off the bore hole,
- 3- a means of preventing the walls of the bore hole from collapsing or caving in, especially when drilling through unconsolidated formations,
- 4- The diameter of the well must be large enough to permit lowering tools down the hole and permit application of newer drilling techniques.

Cable Tool Drilling Technique

Although the rotary drilling technique is used more frequently today, the cable-tool is still used in some cases nevertheless.

The cable tool is not a drill in the common sense, because it is not power rotated. It operates much like a seesaw with a powered walking beam mounted on a derrick. Penetration is achieved by repeatedly lifting and dropping heavy iron string and a variety of drill bits on the borehole. A chiseling effect of the drill bits on the rock crushes consolidated rock into small fragments. "The length of cable is adjusted so that on the down stroke, the tools stretch the line as the bit hits the bottom of the hole, striking with a sharp blow and immediately retracting

The drilling process has to be stopped at intervals to get rock cutting off the bore hole and water is added either by the driller or flows in from the formation to do this. The water mixes with the crushed rock particles and turns it into slurry that settles at the bottom of the bore hole. At a point where the slurry accumulates to a quantity that begins to reduce the penetration to an unaccepted level, drilling is stopped and the slurry is

removed by a bailer. The bit is reinstalled into the hole and drilling continues after each stage of removing slurry.

Advantages of Cable Tool Drilling

Cable tool drilling has the following advantages.

1- A relatively cheaper drilling method. The capital cost of a new cable-tool rig and maintenance expenditure are relatively cheaper than that of a rotary drilling rig of similar capacities.

2- Efficient use of personnel. Cable-tool rigs are often operated by one or two persons.

3- Suitable for water poor areas and remote settings. This is due to the fact that the cable tool drilling requires little amount of water and identifies each water bearing formation penetrated in addition to its low fuel consumption and reliability.

4- Qualitative and quantitative data; including good flow estimates, temperature, water chemistry measurement and static water level, can be obtained while drilling.

Disadvantages of Cable Tool Drilling

Cable tool drilling has the following disadvantages.

1- Directional drilling is impossible as this method is limited to vertical holes.

2- Depth and penetrating rates are very low, especially through hard rock formations.

3- In unconsolidated formations, casing must be driven as drilling progresses. Collapsing or caving in of the formation is almost inevitable without immediate casing.

4- Blowout preventers are not easily adapted.

5- Productivity measured in hole produced per day is low compared to rotary drilling on similar formation.

6- Lack of experienced personnel. With more abundant rotary drilling rigs to-day, a cable-tool driller with a wide range of experience is hard to find.