Mud density essay

Mud weight otherwise known as drilling fluid density is a very important property of the drilling fluid which must be determined regularly during the drilling process. It is defined as the weight per unit volume of the drilling fluid or drilling mud usually expressed in units of g/cm3 or more conveniently lb/gal. Drilling fluid density or mud weight must be measured at regular intervals of the drilling process because as different formations are encountered during the drilling process, different fluids and substances are released by those formations into the drilling fluids which alter the density of the mud.

In many cases, if these variations in mud weight are not controlled (which can only be known by checking the mud regularly), hazards such as loss of circulation and potential blowouts can be risked. But by regularly checking on the mud weight, those risks mentioned above can be prevented from occurring. Since the hydrostatic pressure of the mud depends directly on the density of the fluid and if the hydrostatic pressure is much greater than the formation pressure, it can lead to the losing of the continuous phase (liquid phase) of the drilling fluid to the porous formations (loss circulation).

Conversely if the hydrostatic pressure of the drilling fluid is less than the pressures of the formations encountered, this can lead to the gushing of the formation fluids into the drilled wellbore which if not properly checked, can lead to blowout (the most dangerous hazard in drilling). The aims and objectives of this experiment were to determine 1. The density of known mud volume in units of lb/gal. 2. The prevention of flow of formation fluid into the wellbore or the hole. 3. To ensure that the drilling fluid must exert a greater pressure than the formation fluids penetrated by the bit 4.

That the pressure exerted by the mud at any depth was related directly to its density. 5. The loss of circulation that may result from excessive hydrostatic pressure due to mud that was too dense or heavy. LITERATURE REVIEW Density (Mud weight): Mud density is the weight per unit volume of mud and normally reported in Pounds Per Gallon (PPG). Mud density is used for providing hydrostatic pressure to control well for drilling operation. (www. Drilling formulas. com) The density of the drilling fluid is important to maintaining well control. As mentioned earlier, fresh water has a density of 8. 4 lb/gal, with a corresponding gradient of 0. 433 psi/ft. As long as the formations have the same gradient, fresh water will " balance" the formation pressures. Since this is generally not the case, some weight material must be added to the fluid, the most common being barite and hematite. The drilling fluids density is measured using a " mud balance". This balance contains a mud cup on one end of a beam with a fixed counterweight on the other end of the beam. The beam is inscribed with a graduated scale, contains a level bubble and a movable rider.

When the cup is filled with fresh water, steel shot is added to the counter weight container until the beam is level, with the rider pointing at the 8. 34 scribe line. During well site operations, the mud's density is checked by filling the cup with drilling fluid and moving the rider until the level bubble indicates the beam is balanced. The density is then read using the position of the rider. (petroleum engineering workbook by Baker Hughes INTEQ Training & Development 2520 W. W. Thorne Houston, TX 77073, United States of America)

The most simple but yet significant measurement the driller can make are that of mud weight or density. No visual estimate can be made. Density can be measured by weighing a known volume. Density can be stated in any convenient units such as lbs/ft3 or g/cm3. To prevent the flow of formation fluids into the hole, the mud must exert a greater pressure than that of the fluids in the porous rocks that are penetrated by the bit. The pressure exerted by the drilling mud at any depth is related to its density, hydrostatic pressure, psi = (lb/gal X 0. 052) X depth.

Loss of circulation may result from excessive pressure due to mud that is too dense or heavy. With simple water based mud’s, density is a reliable measure of the amount of suspended solids. Solids that do not contribute useful properties (i. e. most drilled solids) are definitely objectionable. Abrasive solids like sand cause excessive wear on pumps, drill string and bit. The drilling rate is reduced; a thick filter cake is deposited on permeable formations and the pump does unnecessary work circulating solids which have been collected by in the mud.

For the water well driller, a most objectionable effect of useless solids is the formation of a thick filter cake on the water bearing section. The thick filter cake on the water bearing formation may not be removed completely and consequently impairs the flow of the water. By weighing the mud regularly, the solid content can be estimated so that the corrective steps can be taken before damage is done. INSTRUMENTATION The apparatus used to conduct this experiment include 1. Digital weighing balance 2. Mud weighing balance 3. Chemical samples 4. Distilled water