

LOST CIRCULATION

Lost circulation is a serious problem that may occur during a cement job. It normally requires remedial squeeze operations. However, this problem can be detected during drilling as the drilling company would have experienced some problems while circulating.

There are several basic measures that are taken to handle the problem of lost circulation. Either one, or a combination of these measures are implemented to deal with such occurrences. Usually lost circulation zones are incompetent zones that are separated at relatively low hydrostatic pressures. Loss of circulation can also be experienced in cave-like or vuggy formations.

The addition of a bridging material to a slurry controls a lot of lost circulation situations. Bridging materials serve to bridge over fractures, thus blocking weak zones and improving the resistance of the zone to separation due to pressure.

There is an extremely wide range of bridging materials. They can basically be termed as granular, cello flake or fibrous.

Granular - Two of the best example of granular lost circulation materials are ground coal cement extender and gilsonite. In most cases they are angular and chemically inert. the main use of granular lost circulation materials are for bridging off fracture vugs.

Cello Flake - For decades, cello flake has been an effective lost circulation agent. It is basically a flake that forms a mat at the face of the zone that is experiencing lost circulation.

Fibrous - Fibrous materials are not used in cementing because of their ability to severely retard. Nevertheless, they form interlocking mats that can be used in mud systems. The majority of fibrous materials contain tannis or lignin.

The gelation of mud can also lead to breakdown of a formation. This occurs as a result of mud making contact with the cement. The gelling problem can be so severe that extreme viscosity can be experienced. As a result, weak zones are put under extra stress when additional pressure is now needed to pump during mud displacement. As a consequence, water can be lost to the formation or a total loss of circulation can be experienced.

This problem can be alleviated by the use of a properly designed spacer fluid that is compatible with both the mud and cement slurry, such as P-PFS. The spacer material can be designed to use the same lost-circulation materials used in the cement slurry and drilling mud.



The excessive hydrostatic pressures exerted by normal cementing slurries can be reduced to help prevent excessive pressures on incompetent zones. Slurries can be lightened by the use of the extenders. There are also special light-weight cements available to achieve this end.

An important consideration where lost-circulation problems occur is the use of Thixotropic Cement, discussed under "Special Cement Systems". This system makes use of a special thixotropic property which prevents excessive fall-back of the cement slurry after the top plug has bumped. The cement slurry has a low viscosity while in motion but quickly develops a gel structure when pumping stops. As the gel structure develops, the downward hydrostatic forces are distributed to the walls of the borehole relieving much of the force on the lower zones. Quite often the slurry becomes self-supporting.

Finally, where lost-circulation problems are so severe that they cannot be controlled by the methods discussed above, a mechanical method must be used. This usually involves the use of a stage tool and baskets.