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## Serpentine structures

1 message

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To: Dr Joe <dr.joe.xie@gmail.com>

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Joe

A brief report on drilling serpentine structures from a drilling perspective to assist in future planning of drill holes or programs

1. Serpentine is a very old and soft rock structure that generally holds it water and has areas of weathering and decay
2. Serpentine has a very low shear factor
3. Serpentine is susceptible to fluid weathering during drilling operations
4. Serpentine creates a very fine intrusive sand structure in faulted areas.
5. Serpentine has an extremely high hydraulic lock factor due to the points as stated above

In a nut shell serpentine deposits are well known for their fault zones and frequent shearing and hole collapse. This usually leads to what is termed as hydraulic lock ( Fluids pumped down hole permeate the surrounding rock structure pressurising the rock structure and pushing it onto the rod string ). This creates a situation that stalls rotation and feed down and feed back capabilities stalling the drilling process. Sometimes if we can reduce water flows to a bare minimum in these zones we can pass through these zones and once on the other side we can proceed onwards. The reason for this is that once past these zones the fluid movement at the bit face is not being forced into the immediate present rock structure and assists with decreasing hydraulic lock.

Usually the zones are an ongoing problem and will continue to silt and cave from mild to extremely severe variations. Grouting can assist with sealing out some of the minor zones if we have been able to penetrate through and get a good hole flushing operational.

However severe zones will create hydraulic lock during the entry, pass through and once through phases because it is so unstable that it caves onto the rod line and does not allow the fluid pass through the hole annulus and once again forces the fluid into the surrounding rock structure creating Hydraulic lock. Boggng rods.

These areas are realistically impossible to place grout . Due to the fact that the surrounding rock structure is so intrusive that it displaces any and all grout if it can even be place correctly.

The grouting process usually only works if we can get below the shear zone and get a really good fluid movement and flushing happening. We also need good fluid movement to correctly place the grout ( hydraulic lock prevents this happening )

Simply placing grout in the rod line and letting gravity take control is not an acceptable option with ground of this nature as it disseminates as it falls through the fluids in the rod line and will more than likely bridge in the rod line or hole leaving to much to chance as well as knowing that it is not going to permeate the zone that we would require it placed.

Serpentine structures are renown for the behaviour as stated above and is certainly the most unpredictable structures that create a vast majority of early hole terminations that I have encountered in my 46 years in the drilling industry

Please note that it is not unusual for very competent looking structures to collapse for no obvious reason. This is nearly always due to fluid weathering and the very low shear factor of Serpentine

TCGA 001

This hole had dubious areas from 6m through to 290m area but stayed very open and free. From the 290m( Cased out HQ to 321m )mark through to 390m we had numerous bad zones but they were manageable until 390m ( Cased out NQ to 426m )

From 390m through to 576m we had numerous bad zones that were manageable and rectified by a grout job that was very successful but the Zone from 576 on was prolonged and very severe an we reached the stage where we would

break of the rod string and if we had passed through this area we would not have been able to shut it out.

Our options were very limited and I doubt that we would have advanced the casing into 582m. Add to the equation that even if we could have I have serious doubts that we would have advanced much further before we encountered the same issues.

Serpentine is possibly the most unpredictable and worst structures that I have encountered in my drilling experience. I am not just referring to TCGA 001 but all Serpentine structures.

If you have any further queries or specific questions on this subject please contact me and I will attempt to resolve them.

Max