Eliminating MWD Issues

TOLTEQ™

Transforming downhole data into downhole intelligence

SUBJECT: REDUCING OR ELIMINATING MWD ISSUES IN ERD THROUGH PULSER/SURFACE SYSTEM SELECTION

PRODUCTS: TOLTEQ TMP, GUIDE MWD SURFACE SYSTEM

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SUMMARY

With the advent of extended reach drilling (ERD), and the demands that are pushing the known limits of current technologies, the potential for drilling complications has increased considerably. Amongst them are problems that can wreak havoc on the MWD tool string. To reduce MWD issues and equipment down time throughout a drilling job, Tolteq recommends several practices.

PULSER SELECTION

First and foremost is the selection of the most appropriate mud pulser—retrievable versus non-retrievable. This decision may boil down to economics and availability, both very real challenges for smaller independents. In the case of ERD, pulse delivery should be a major consideration, and for this reason, a non-retrievable top mount pulser (TMP) is highly recommended. A TMP, due to its more robust integrated design, provides a much stronger pulse. In addition, because the TMP sits at the top of the MWD tool string where there are fewer obstacles to impede the flow, such as centralizer fins, the pulse will be more stable. This is ideal in an ERD application, where attenuation of the pulse signal becomes a very real concern.

The TMP's stronger pulse can reduce the negative impact of certain environmental conditions such as lost circulation and excessive drilling noise, or pulse waves in the mud column resulting from the vibration of the drilling operation at shallower depths. As a result of tremendous drilling noise, the tool signal and data quality at surface can be degraded.

Historically, these common issues have been countered by utilizing less aggressive drill bits and drill plans, resulting in lower ROP and extended rig time. However, the TMP serves as a preventive tool, and if utilized from project initiation, allows for more aggressive drilling operations and higher ROP in many circumstances.

Unlike a TMP, a traditional downhole pulser is usually not locked down to the UBHO sub, and is free to move within its containing drill collar. While measures are taken to minimize tool string movement (such as finned centralizers), additional shock and vibration will inevitably result from the movement. Therefore, if a TMP is not a feasible option, locking down a retrievable tool string becomes crucial for a safer, more stable platform to take measurements.

SURFACE SYSTEM SELECTION

Another defense against excessive shock and vibration is the proper selection and configuration of the surface system. An effective system should always be able to receive and display real-time shock, vibration and rotation data. Because bit control is critical in ERD, continuous high vibration can become a serious problem. Vibration reduces the energy that is required by the bit. For example, axial vibration leads to bit bounce and torsional vibration can cause stick-slip. In extreme situations, vibration can also damage the MWD/LWD tool string. Real-time data becomes indispensable in allowing the directional driller to make on-the-fly changes to avoid these issues.

Regardless of the amount of preparation or the selection of the downhole equipment, it is inevitable that some noise will be present. ERD naturally lends itself to potential issues for decoding pressure pulses due to the increased depth and as a result, it is vital for the surface system to have the ability to filter out disruptive noise from the tool signal. Historically, legacy equipment required the filtering to be applied manually to specific frequencies and bandwidths (in the form of notch filters or manually adjusting the bandwidth limits). Today, advanced surface systems automatically process the pressure data through independent filters in order to make the most accurate data available at all times. This capability drastically reduces the guesswork typically associated with decoding with legacy MWD systems, thus minimizing rig down time and decoding issues.

OUR SOLUTION

In drilling, challenges will arise without warning, especially with outdated MWD equipment. To minimize or eliminate common issues with ERD, we recommend the Tolteq TMP and the Tolteq GUIDE MWD Surface System, all of which meet the requirements discussed in the previous sections.

A TMP offers several design advantages over retrievable pulsers. The Tolteq TMP offers all of these advantages, plus additional features that set it apart from competing units. The Tolteq TMP offers a less complex design with fewer parts, allowing for easier maintenance, three sizes based on the collar that provide for wide flow ranges without the need for adjusting the pulser, and an efficient solenoid-based assembly to extend battery life.

In conjunction with a Tolteq system that includes the TMP, GUIDE will receive and display real-time shock, vibration, and RPM data when configured at the surface. These vital measurements may be configured to transmit as a warning (lowest bit), a range, or as an actual value (highest bit), based on your bandwidth requirements. To compensate for excessive drilling noise and pulse signal attenuation, GUIDE features AIM (Automated Intelligent Matrix) filtering. With AIM, GUIDE is able to analyze eight filters simultaneously, and select the strongest pulse every time, without any extra work from the user.

By proactively evaluating MWD processes and employing a Tolteq MWD system to aid in ERD, directional drillers can increase efficiency and decrease down time to get the job done.