

ELECTROMAGNETIC

Electro-Magnetic MWD systems use the same basic sensors and power supplies as the mud pulse systems. The main difference is in the transmission of data. Rather than using the drilling mud to send pressure waves, the tool sends either a magnetic pulse or electrical current through the ground to the surface. On surface the data is received through ground antennas and the data processed. EM systems are significantly faster (10x) than conventional mud pulse. In addition data can be sent at any time (not just when the rig pumps are circulating). The net result is faster overall drilling times. In addition the EM systems are the only practical method to drill under-balance wells involving the use of air, nitrogen, and foam. EM systems have no moving parts and do not create significant restrictions in the drill string. As a result the reliability is significantly higher, and damage from erosion caused by drill solids is minimal. EM tools do have depth limitations which are a function of how much power can be supplied by batteries for the duration of the drilling interval, and at higher power settings the battery costs may be significant.

Electromagnetic Measurement While Drilling "EM MWD" Services

The EM MWD tool is a wireless MWD System which utilizes low frequency current-loop signals to communicate data to the surface. The EM tool is installed in the BHA and injects electric current into the formation downhole while drilling. An antenna (ground stake) is driven into the surface, which measures the voltage differential (potential) between the stake and a line tied into the casing on the drilling rig. This signal is processed thru surface computers to decode the downhole data. EM signals are not affected by the drilling mud properties or rig pumps and have a significantly higher data rate than mud pulse systems.

Applications:

- Under-balanced drilling
- Shallow gas / oil well drilling
- Fast horizontal well drilling
- SAGD
- PDC bit drilling
- Rigs with low pressure ratings

Features:

The EM MWD tool can be operated at a variety of frequencies, allowing for either high data rate, or extended depths (over 3,500 m) without the need for repeaters or long wire systems. Advanced digital filtering techniques allow two or more rigs to drill on the same pad without interfering with each other's signal transmission. The tool has directional, gamma ray, and pressure sensors, making it versatile enough to accommodate most of your directional and underbalanced drilling requirements. The wireless communication operates independent of rig pumps and creates virtually no additional pressure restrictions in the BHA. Access to the microprocessor can be made through a unique side entry data port on the rig floor. Simply plug into the tool to program it, retrieve recorded data, or put it to sleep between wells to conserve battery life. The instrument section may be left in the non-magnetic collar between wells or during casing breaks to save rig time handling tools.

The EM tool has become a full service tool and able to have "talk down" capability. The tool can be fully controlled from the surface, changing data rates, transmission formats, power levels etc, while drilling.