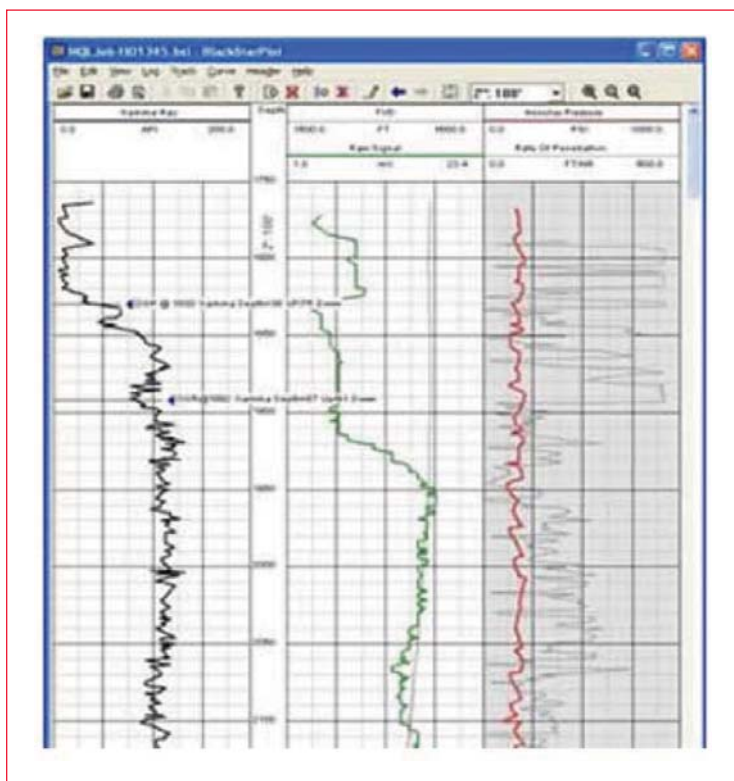


EM MWD Services

Using a Resistivity log of an offset well and information from the well plan, a very good estimate of EM tool performance under a given set of circumstances can be made. With the model, customer can optimize the drilling and well bore parameters to maximize EM transmittance, or make a determination whether or not EM tools are a good choice for a particular job. The intelligent database data acquisition and log plotting package is fully automatic, requiring minimal operator interface.

Sensor Placements:

The gamma ray detector is located about 5 Ft. back from the bottom shoulder of the pressure orienting sub. Log plotting and data transfer options include standard thermal line plotter or color inkjet printer. We can provide format such as LAS, PDF, and CVS formats.



Formation Resistivity 3 to 1000 ohms/ meters

The BlackStar EM-MWD system provides the user with two Gamma Module options for their logging and geosteering applications; a 360 Gamma Module and a Directional Gamma Module. The 360° Gamma Module or omni-directional Gamma Module is the better choice for correlation logging because it offers greater sensitivity over the Directional Gamma Module, and it is much less susceptible to damage due to shock and vibration. The 360° Gamma Module I is normally used in the vertical or build section of a well.

The **BlackMax Directional Gamma module** contains a gamma detector that is mounted within a tungsten shield which substantially attenuates the naturally occurring gamma radiation that is being emitted by the surrounding formations in all directions except in a location where a 1/2 inch wide by 5 inch long slot has been cut axially into the shield. The slot in the shield allows the Gamma rays to enter the detector with minimum attenuation within a window that is approximately +/- 60 degrees wide centered about the long axis of the gamma detector. The slot in the tungsten shield is physically aligned with the High Side of the MWD tool allowing its position relative to the gravity high-side of the hole to be controlled by the directional driller. This tool configuration is then used to try to determine bed boundary locations by utilizing the amount of naturally occurring radioactive materials that is contained within the formations of interest. Normally, a coal will contain fewer of the naturally occurring radioactive elements than an adjacent shale or siltstone.