

Title: **Innovative Approach to Deal with Interference**

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One of the greatest problems encountered by Horizontal Directional Drilling contractors occurs when attempting to locate / track near *active interference* sources. Besides the production killing delays, active interference sources can make drill depth readings highly erratic, completely eliminate Roll & Pitch data and make pinpointing a drill-head / transmitter housing all but impossible. *Active Interference* sources include but are not limited to: cathodic protection on steel pipe / tanks, overhead / underground electrical power, tracer tone lines, electrified or signal carrying railroad track, electrified or buried fencing, security systems and traffic control lights. Originally, an HDD contractor's solution for active interference was limited to using a more powerful transmitter such as 19-inch-long variants or cable transmitters. As the HDD locating industry evolved additional frequencies were made available that dealt with some but not all of the active interferences routinely encountered. As many as five alternate frequencies were wound into transmitters and the above-ground hand held receiver so contractors had more possible solutions than ever before. Eventually multi-frequency transmitters were offered which allowed HDD crews the ability to change the transmitter's broadcasting frequency underground without having to trip out an entire drill string. Wire-line steering tools have long been and still are viable albeit expensive solutions being employed by HDD crews when active interference has over-whelmed a walk-over receiver or is too close to the transmitters broadcasting frequency. Like our HDD industry brethren, the down-hole tooling and drilling mud manufactures who correctly state "there is no universal ground condition, so there is no universal tool bit or mud recipe", we also know there is no universal transmitter frequency.

Instead of trying for a handful of "best" frequencies, locating advancements have finally lead to a single transmitter and receiver combination that effectively overcomes active interference sources on a scale never thought possible. Nearly 1000 distinct transmitter frequencies are available between 4.5 and 45 kHz using a single transmitter and walk-over receiver combination.

The paper describes briefly describes current ways of identifying the presence of interference and contending with it. It then discusses a unique new method for dealing with interference which has proven to be more effective than what is used today. The paper describes the underlying technology and how it is deployed in the field. It then discusses how this new approach can be used to improve the performance of the locating system in the presence of interference.

An additional benefit to avoiding active interference is realized when bore information has to be logged. The better the locating data is (due to reduced effects of interference), the more accurate the resulting documentation will be. The paper will discuss some new developments in the area of Log While Drilling (LWD).

A few recent HDD projects where the new technology has been used are described, detailing results from the field together with a qualitative view of the benefits of this new technology.

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