

# Case Study

## Complex Intercept Using Precision Magnetic Ranging

### APPLICATION

Wellbore Re-Entry / Intercept  
(Plug and Abandonment)

### TECHNOLOGY

EverReady™ Magnetic Ranging

### LOCATION

Huntington Beach, CA, USA

### CUSTOMER CHALLENGE

The Customer is responsible for a previously abandoned well, originally spudded in 1922 and worked over/ "plugged" in the 1950's. The well was abandoned by dropping cedar wooden poles of various sizes into the well and bailing small amounts of concrete on top of the poles. This method of abandonment was commonly used at the time but is no longer acceptable by current standards as it does not present a permanent durable barrier between hydrocarbons and surface/ground water.

The 16" casing was corroded at surface and the old wellbore was collapsed/inaccessible. Re-entering the well from surface was attempted over the course of several months but was unsuccessful.

### GUNNAR ENERGY SOLUTION

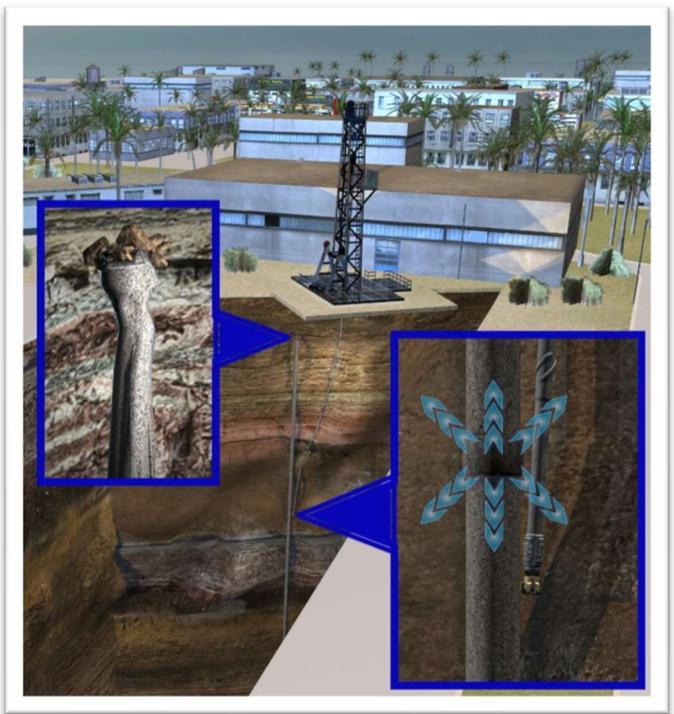
Gunnar's proprietary EverReady™ Ranging System was used to generate the accurate, precise information necessary to allow for a successful intersection and re-entry of the target wellbore. Gunnar identified the 10<sup>3</sup>/<sub>4</sub>" casing stump, which was inside the 16", as an ideal "homing in" landmark, and concentrated all the efforts on this shallow reference point.

The casing stump was identified with a reconfigured MWD probe from a pilot hole. Gunnar modeled the residual magnetic field to determine the distance and direction to the stump. The wellbore was more than 6' from the operator's attempted intercept despite the shallow depth. The wellbore was intercepted by a sidetrack in two places with one wellbore; below and above the casing stump. A 5'-6<sup>1</sup>/<sub>2</sub>" window was milled at the upper intercept. This allowed cleaning out and plugging the existing wellbore several thousand feet deeper.

### CUSTOMER VALUE

Passive magnetic ranging has a checkered history of success and is commonly not considered as an alternate to more expensive active ranging methods. However, passive ranging can replace active ranging in certain situations. In this case the intercept was accomplished, and a window was milled **without the need of costly technological alternatives spanning from \$600k to \$1.3 million**. Many plug and abandonment projects can also realize significant savings when the right ranging technology is applied.

Illustration of Predicted Downhole Geometry



Milling Visualization Plan

