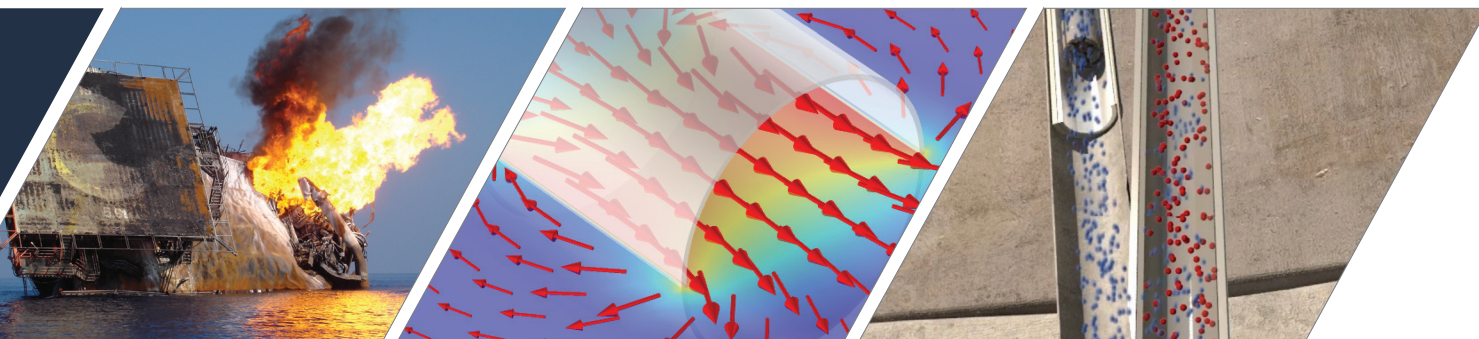


Casing Magnetization

Relief Well Contingency for Shallow and Subsalt Reservoir Blowouts



Casing Magnetization is recommended as a relief well contingency for blowout scenarios where active ranging systems have limited utility. These scenarios often consist of either a high formation resistivity region (salt) or a relief well trajectory requiring a high incidence angle approach on the intersection (shallow intersections). Due to the anticipated reduction in detection range with active ranging methods, passive ranging becomes the primary method for obtaining a proximity measurement to the target well.

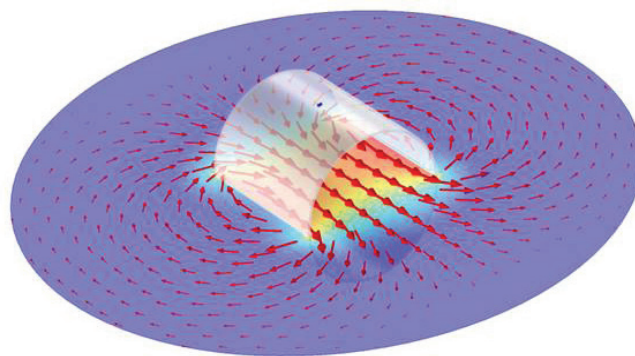
By pre-magnetizing the pipe prior to installation, the uncertainties in passive ranging techniques caused by unknown polarities, pole positions, and variations of field intensities from one joint to another can be eliminated. Once the pipe is magnetized, the ferromagnetic domains within the pipe are aligned in the desired orientation, and the pole strength, positions, and polarities are now configured to a known measured state.

Depending on the installation configuration and size of the pipe, the increase in pole strength from magnetization will increase the detection range significantly. The detection range can, in cases, be increased by as much as four times which greatly enhances the probability of locating and intersecting the blowout well on the first attempt. In a blowout scenario, this is highly desirable as it will reduce the amount of time where there is an ongoing release of hydrocarbons by shortening the time frame to kill the well by potentially days or weeks.

The Magnetization Process

Wild Well has developed a range of magnetization coils for different casing diameters which allow for customization of a magnetization program to best suit customer requirements.

The system is custom-designed to create a large magnetic field within the coil when injected with a DC current. As the coil is passed over the joint of the casing, the ferromagnetic domains within the casing align to the field of the coil. Once the applied field from the coil is removed, the pipe is left with a residual magnetic field, which is uniformly distributed and of much higher magnitude than it was prior to magnetization.



Model of Magnetic Field from Magnetization Coil

Features

Engineered Solution

Wild Well's magnetized casing installation strategy is customized for each individual well. Wild Well is the industry leader in relief well design and uses detailed finite element and analytical software to determine the optimum configuration and number of joints to be magnetized in order to enhance the detectability of the string. In the event where relief well intervention is required, the improved detection capability will increase the likelihood of a successful intersection.

Global Deployment

Based out of Norway and the United States, the magnetization coils are portable fixtures that can be dispatched globally by regular air freight options. Typically, casing magnetization is performed at the casing storage yard, which allows the magnetization to be performed alongside other casing preparation activities prior to shipping the casing to the rig.

Quick Turnaround

Depending on the installation strategy and the number of joints to be magnetized, the magnetization process typically takes a team of two magnetization technicians and a forklift operator at the supply base approximately three to four days to complete.

Operational Requirements

- Dedicated forklift operator at the casing yard
- Access to mains power: 100–240 Vac, 47–63 Hz

Benefits

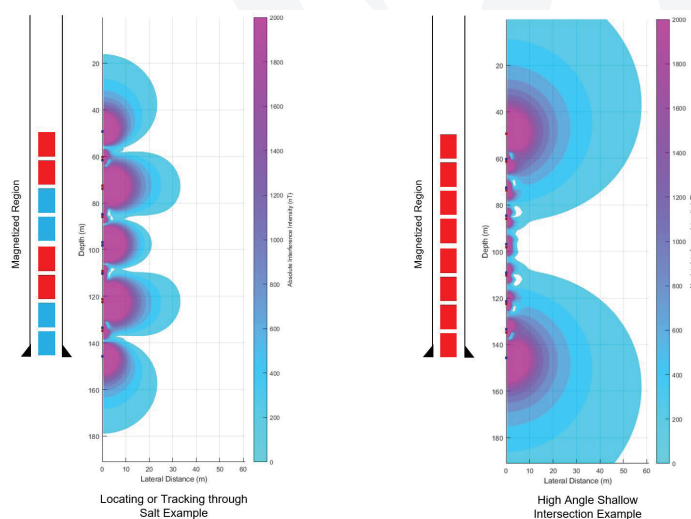
Subsalt Blowout Contingency

The ranging strategy for a subsalt relief well typically consists of a combination of active and passive magnetic ranging. Ideally, active ranging methods will be used in the regions above or below the salt, if there is sufficient space to do so. If this is not possible, the ranging strategy for the relief well will require the locate-and-follow phase to take place throughout the salt region with reduced detection range capability using passive ranging.

To improve passive ranging performance, several sections throughout the salt region can be pre-magnetized. With casing joints of uniform magnetization, the installation pattern can be varied, depending on the desired detection rangeability and relief well strategy. The optimum configuration can be determined with the use of magnetostatic finite element models, which can be generated on a case-by-case basis.

Shallow Reservoir Blowout Contingency

Shallow reservoirs requiring relief well intervention present a challenging relief well trajectory. This is due to the limited TVD for directional drilling to take place from the kick-off point to reach the desired intersection depth and overcome the surface offset. The casing magnetization strategy for a shallow reservoir scenario attempts to create the maximum field strength possible at the shoe. This allows for a large detection range for the near orthogonal approach. The amount of pipe to magnetize may range from several joints up to ten joints depending on the relief well strategy and overall positional uncertainty to overcome.



Magnetized Casing Installation Models

The plots above demonstrate multiple finite element simulations of magnetized casing sections configured in different orientations. The models show the intensity of the magnetic interference expected based on the proposed installations. The plot on the left is a typical example of an installation strategy optimized for locating / tracking through a salt region where the casing has been magnetized in a specific alternating pattern. The plot on the right highlights a shallow reservoir arrangement where all casing is magnetized in the same direction, which creates a large field near the casing shoe.

For more information, contact Wild Well Control at info@wildwell.com.