Deepwater Horizon; Burning and Going down

Helideck
4.3.2.1 Scenario 1 – Well Flowing Up Annulus Only

Drawing not to Scale
Wellbore Depths Referenced to Original Drilflor
Wellspot Principle

- Current emitting electrode
- AC current on target well
- Wellspot tool in open hole
- Electromagnetic field lines

\[ H = \frac{I}{2\pi r} \]

- Field strength
- Radial distance from target

Wellspot tool measures field strength and its radial gradient
Case History

Plug and Abandon

- Southern California
- During a workover to repair a casing shoe leak, a gas utility sidetracked out of 5 1/2” casing in an injection/withdrawal well due to a severe dogleg. Subsequent attempts to re-enter the casing were unsuccessful.
- Wellspot™ guided a sidetrack from 2400 feet to intersection with the 5 1/2” casing at 9912 feet, where a 30-foot section was milled and cemented for abandonment. It was later completed as a replacement well.
Instrument and Insulating Bridle
Wellspot Instrument
Uncertainty Reduction

- Why we need to range – Even good gyro surveys have enough uncertainty. Especially with the combined uncertainty of both TW and DW that the target well cannot be intersected with just the surveys and no ranging.
- Ranging report assigns all uncertainty to the target well.
- Ranging reduces the uncertainty at the ranging Depth.
- Uncertainty builds between Ranging Runs depending on Survey type, but not much because intervals are relatively short.
Figure 39: Example Pictures of Concave Slot Mill for Cutting 7-in casing
Wellspot Downhole Electrode

- No access to the target well required.
- Operated on wireline in open hole.
- Low approach angle necessary.
- Maximum range is approximately 60 meters.
- Precision is approximately +/- 25% of range.
Magnetic Guidance Tool for drilling SAGD wells

electromagnetic field from guidance tool is measured by an MWD probe.
Homing in Using Single Wire

MWD

electromagnetic field lines

\[ B = \frac{\mu_0 I}{2\pi r} \]
Rotating Magnet Ranging Service for SAGD
Argentina 2012- Before and After
Bangladesh 1997
California 1998
California Geothermal 1998

Big Blow of Brine
CALENERGY, Calipatria, California  April 28, 1998
Canada 2000
Hungary 2000
Sabotage in Nigeria 2010
India 1999, 3 of seven wells on the platform are blowing out, 3 relief wells