

> DRILLING OF TWIN WELLS IN SAGD PROJECTS



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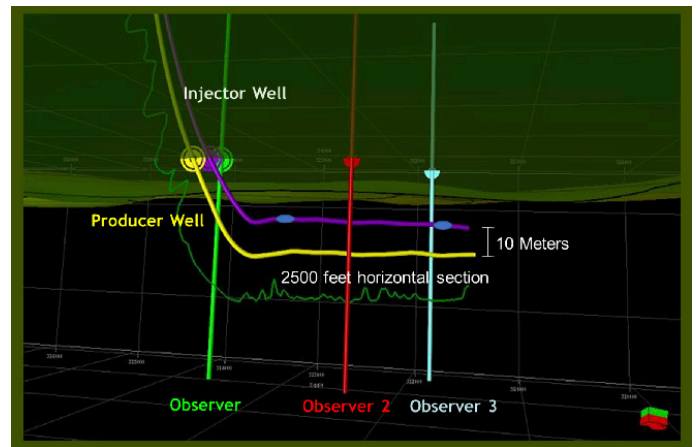
SAGD (steam-assisted gravity segregation) is an enhanced oil recovery technology for producing heavy, extra-heavy, and bitumen crudes that involve an advanced form of steam stimulation. Two parallel horizontal wells are drilled into the reservoir, spaced a few meters apart on top of each other.

The challenge for the drilling team and the geology area is to build the two TWIN wells and locate them within the same reservoir, respecting the calculated separation distance. There are several and tools to build the wells and perform a successful geosteering.

A technique used with good results is the **Rotating Magnetic Location Determination System**, a proven directional technology in horizontal wells, which allows determining the location of the well to be drilled with respect to the neighboring well, when the distance between wells is very close, and this location, it is not possible to determine it with conventional tools (Measurement while Drilling; MWD), due to the presence of magnetic interference, which could cause a collision.

Main Stages during drilling.

- 1. Drilling of the Producer Well:** This well is located at the base of the sand. This is drilled with conventional techniques. (It is important to guarantee the lateral continuity of the sand).
- 2. The Injector well begins to be drilled;** Once the surface phase is completed, the directional string is lowered to drill the intermediate hole.



In this phase, the magnetic guide tool is used, which helps to more accurately position the injection well, reducing errors in the survey.

This tool consists of placing a magnet installed transversely inside a sub which is assembled in the BHA, just above the wick. As the bit rotates and drilling progresses, magnetometers located in the producing well (the producing well emits a signal), measure the variation of the magnetic field frequency versus depth.

The MAGNETIC tool is not affected by terrestrial and tubular magnetic fields, thus minimizing the uncertainty in the trajectories of the wells caused by the magnetic field phenomenon. This tool works in the intermediate phase and horizontal section of the Injector well, thus managing to drill two TWIN wells.