

# TECHBRIEF

## REAL-TIME WELLBORE MONITORING FOR KICK DETECTION

### OPPORTUNITY:

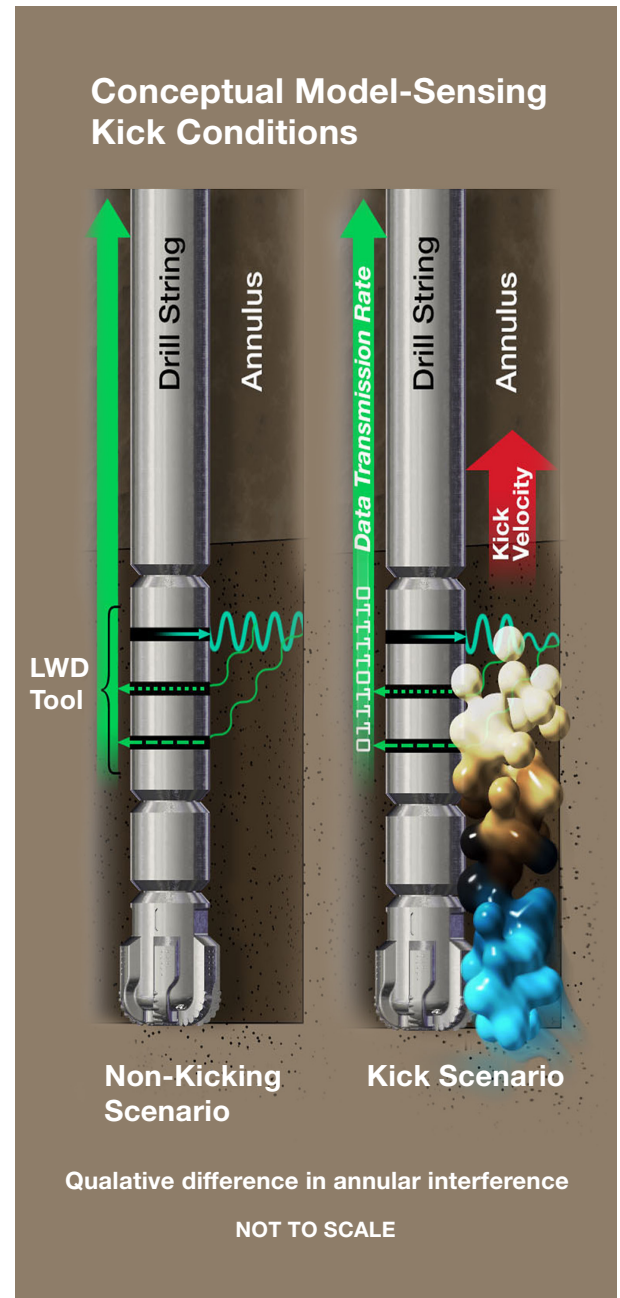
Research is currently active on the patented technology titled, “Kick Detection at the Bit Using Wellbore Geophysics.” This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy’s National Energy Technology Laboratory.

### OVERVIEW:

Currently, most subsurface drilling operations rely upon mud returns to the rig floor to identify when a well being drilled for hydrocarbon or other subsurface purposes is taking on a “kick” from hydrocarbon, gas, or water from the surrounding strata. By the time the drilling mud carrying the kick material has reached the rig floor, the ability of the drilling operator to mitigate potential impacts of the kick is limited. Many drilling operations use logging-while-drilling (LWD), measurement-while-drilling (MWD), or seismic-while-drilling (SWD) borehole geophysical tools to help guide drilling operations. Subsequent analysis of these logs also provide key information about the geologic strata and pore-filling media (fluids, gases, etc.) surrounding the borehole. However, this data is not presently utilized to fully evaluate the intra-borehole environment to inform drilling operational decisions, which puts the drilling rig, operator, personnel, and surrounding environment at risk if the kick cannot be constrained and brought under control quickly.

This invention describes an early detection system for identifying changes in the intra-borehole environment related to invasion of fluids, water, gas, or oil, from the formation into the wellbore at or near the drill bit in order to provide close-to-near-time information on the wellbore environment in close to real time. The invention leverages data obtained from LWD, MWD, and SWD to detect kicks around the drill bit. The information is processed in real-time by novel algorithms and approaches. Ultimately, the goal is to provide drilling operations with an early warning system before the kick ascends to the rig floor.

It is anticipated that the use of this technology to rapidly identify kicks will improve safety, reduce operational costs, and lessen the likelihood of a loss of control event during drilling operations.



(continued)



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**SIGNIFICANCE:**

- Provides real-time detection of pressure changes in the wellbore
- Implementation will reduce risk and potential human and environmental impacts associated with loss of control events
- Cost savings due to less drilling downtime

**APPLICATIONS:**

- Onshore and offshore subsurface drilling operations

**RELATED PATENTS:**

U.S. Patent No.: 10,253,620

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Title: Kick Detection at the Bit Using Wellbore Geophysics

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