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## Abstract

### Objectives/Scope:

Drilling Optimization Utilizing Sensors

### Methods, Procedures, Process:

Wireline and MWD/LWD tools can obtain a wide range of measurements such as wellbore trajectory, and formation characteristics. Advancements in MEMS technology have paved the way for building logging tools at the micro/nano scale. Field tests performed in wells with MEMS devices showed that such devices can flow right to the bottom of a well and up again to the surface, therefore providing a full profile of the wellbore (See figure below).

### Results, Observations, Conclusions:

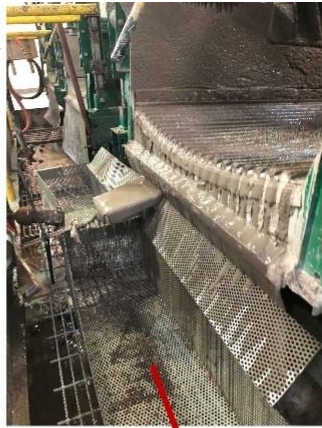
Over the years, wireline logging has been used to obtain downhole parameters, but only after a drilling assembly has been pulled out of the hole first. MWD/LWD have proved capable of providing near real-time data during drilling, but their low bandwidth pulse telemetry communication method has not progressed at the same rate as downhole sensors. Field trials of the MEMS devices demonstrated the ability to work at depths of 13800 feet, and temperatures of 305 °C as well as during drilling at ROPs of up to 180 ft/hr and top drive speeds of 100 rpm. Alternative tools give the driller options to choose the optimal tool for a given well/hole section depending on the budget, complexity and productivity of wells.

### Novel/Additive Information:

To address the tradeoff between cost/reliability vs opportunity, currently available logging tools such as wireline and MWD/LWD tools and emerging technologies such as mobile MEMS devices are reviewed from different aspects such as principles of operation, electronics, power generation, size, packaging, cost and field trial results.

Also, a look ahead, discussing new sensor and instrumentation systems/methods that can potentially be used in the oil/gas industry, is presented, and what is still needed to deploy them in the field is also addressed.

MEMS devices injected



Recovery location – shale shaker



Recovered MEMS devices