

Executive Summary

Optimization of the processes required to produce hydrocarbons constitutes an on going strategic concern and a major goal in the oil and gas industry. One of the major problems facing the industry is the low reliability of beam pumps due to pumping with little or no fluid in the wellbore. The goal of this project is to develop a low cost downhole wireless fluid monitor to achieve the following: monitor the rod pump lifting process in wells, provide an audio alarm from downhole to the surface when the fluid level in the wellbore goes below a predetermined level, provide an interface to the pump controller at the surface to stop the pump when the alarm is detected and improve pump reliability during the production of hydrocarbons. There are not any low cost products available commercially in the industry today which are capable of continuously monitoring the fluid level inside the wellbore wirelessly. The ability to monitor fluid levels using low cost gauges can reduce the CAPEX significantly as well as OPEX by reducing the rig time to deploy the gauge in the well and by reducing the number of pump failures. The new system will monitor the fluid level and transmit an alarm based on the generation of an acoustic tone downhole that can be detected at the surface by a real time SCADA unit. This downhole module will be mounted on the side of the production tubing just above the tubing anchor and it will be composed of an acoustic generator, an ultra low power electronic based module for data acquisition and a fluid level detector gauge. The surface system will be composed of an acoustic detector, an electronics data acquisition and processing module and an interface to the rod pump controller. There will be no cables from downhole to the surface and the entire installation can be done within a fraction of the time that it now takes to deploy a standard gauge in a rod pump well.