

Transformative Approach to Enhancing Water Well Integrity and Monitoring in KOC West Kuwait Fields: A Case Study

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Abstract

In the dynamic landscape of hydrocarbon production, ensuring the integrity of water wells is paramount to prevent incidents, conserve resources, and sustain operations. This abstract presents a comprehensive case study detailing the successful implementation of an innovative well integrity and monitoring project in the KOC West Kuwait fields. The project was initiated as a response to a significant water well leakage incident (WW- 0467), which underscored the critical need for proactive measures to safeguard well integrity across the expansive field comprising approximately 1500 wells.

The primary objective of the project was to address the challenges posed by manual inspection and analysis of annular pressure for such a vast number of wells. Traditional methods were not only resource-intensive but also prone to inefficiencies and potential risks. To counter these challenges, the project proposed and executed a transformative solution involving the installation of wireless pressure transmitters on strategically selected wellheads. This novel approach enabled real-time monitoring of annular pressures and the seamless transmission of data to a central server.

Integration with existing Remote Terminal Units (RTUs) and WiMAX Customer Premises Equipment (CPE) streamlined data analysis, transforming the operational landscape by facilitating rapid, accurate, and continuous assessment of well integrity. This data-driven approach empowered decision-makers with real-time insights, thereby optimizing resource allocation and enhancing well integrity management. The project's results were resoundingly successful, with the connection of 70 wells in key zones, including Zones I, II, III, and IV, in the proximity of the leakage incident. Remarkably, the project achieved a remarkable 90% cost reduction through the integration of adaptive technology, which not only showcased its economic viability but also underscored its potential for scalability.

The impact of the project extended beyond cost savings. The implementation of the real-time monitoring system not only mitigated environmental risks but also significantly enhanced operational safety and efficiency. It offered a transformative shift in decision-making processes by providing accurate and timely data for informed choices. The success of this endeavor demonstrated the power of technology-driven solutions in the oil and gas sector, setting a precedent for future well integrity and monitoring initiatives.

This abstract offers insights into the methodology, challenges, achievements, and lessons learned from the project, presenting a compelling case study that exemplifies the potential of cutting-edge technologies to revolutionize well integrity and monitoring practices in complex hydrocarbon production landscapes.