Avoiding environmental and financial impact of stuffing box leakage while increasing revenue on rod pumped wells

Victoria Pons, Ph. D., Pons Energy Analytics

Rob Harrison, Well Site Guard Ltd.

Elaine Lang, Well Site Guard Ltd

Abstract

Prevention technology can help companies minimize their environmental footprint at the source. Operating companies today recognize the benefits of providing a safer work environment and minimizing their environmental impact while minimizing operational expenses.

With an increase in hydrocarbon extraction across the United States over the past few decades, comes more concern over the preservation of the environment. Unfortunately, with oil exploration and extraction practices comes inherent risk of leakage or spills. These spills can range in magnitude from a few gallons or multiple barrels spills, as the result of stuffing box seal failure, deteriorating infrastructure, and inadequate handling practices.

Produced water is the largest waste stream generated by the oil and gas industry. Produced water generally consists of naturally occurring brine present in the reservoir and water injected nearby to push the hydrocarbon deposit into production wells. Also, for shale and tight oil, fracturing fluid and a solid material, called proppant, are injected into the reservoir under very high pressure in order to create fractures aimed at increasing the porosity and permeability of the rock formation. In summary, these contaminants include dissolved salt, petroleum, and other organic compounds, suspended solids, trace element, bacteria, naturally occurring radioactive materials (NORM) and anything injected into the well.

Costs related to a small stuffing box leak or a critical seal failure, such as stuffing box seal repair, very often requires an unplanned pump shut down for extended period, site, and equipment cleaning, using third party companies, vacuum trucks, steamer/pressure truck, specialty waste hauling services, as well as reclamation of surrounding ground surface, contaminated soil removal and disposal at an authorized site plus the potential regulatory fines.

In this paper, Well Site Guard presents the root cause and implication of stuffing box leakage and spills and its significant financial impact on the producers' operational expenses. Available solutions and containment applications are presented. Environmental justification for small investments in capital expense is weighed against the staggering cost of spills and leaks. Finally, cost savings results are discussed followed by case study results and operator feedback.