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New Test Method to Qualify Production Chemicals for Subsea Injection

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Abstract

The application of production chemicals for flow assurance issues entails pumping the chemical to injection points that are either downhole or at the subsea tree via umbilical tubes. The integrity of umbilicals throughout the life of a field is crucial for maximum recovery without any lost production expenses. The new test method qualifies production chemicals for subsea injection by evaluating their long-term stability at seafloor temperature and high pressure conditions to assure umbilical integrity is not compromised.

Current test methods for qualifying subsea injection chemicals involve testing at ambient temperature or pressure. A proper test method should incorporate testing at the injection pressures, which could be up to 10,000 psi and seafloor temperature. However, the product stability at both low temperature and high pressure conditions can change with time (i.e., in the case of extended shut-ins for hurricanes or other reasons). Currently, producers empty the production chemical in the umbilical tubes and replace it with solvent packages to ensure their integrity for long-term shutdowns. The length of umbilicals can range from 3 to 35 miles and their diameters can range from ¼ in. to 1 in. The volume of chemical wasted in flushing the umbilicals of long length and/or large diameter over a period of time can be expensive and unnecessary.

The new test method will include evaluating the chemical characterization, physical properties, particle-size analysis, and performance before and after testing. If no changes are observed the product will be qualified for subsea injection. Previous test methods have not evaluated the long-term stability of production chemicals at subsea conditions.

The unnecessary expenses of chemical wasted in flushing the umbilicals and lost production revenues could be avoided if there is satisfactory lab test data showing unchanged product quality at the injection conditions for long periods of time. This new test method gives confidence to the producers and operators regarding the integrity of the umbilicals, prevents lost production time, reduces the evacuation time of offshore facilities for hurricanes, and provides quicker restarts after extended shut-ins.

Introduction

Production chemicals can play an important role in the enhancement of oil and gas production; they control corrosion, prevent organic and inorganic deposits (paraffin-wax, asphaltenes, hydrate plugs, mineral scales, etc.), enhance flow characteristics and aid in phase separation. These chemicals can be applied through a variety of techniques, including topside chemical injection equipment and capillary/downhole injection. Regardless of type, any chemical injection system must be designed to be effective, reliable, forgiving and redundant. In particular, subsea and capillary chemical injection systems (CIS) are necessary components in most successful flow assurance programs (Shirah 2003). The proper assembly and care of a chemical injection system is extremely important as improper maintenance can ruin the most carefully laid plans. Establishing and following a thorough maintenance routine will aid in preventing any problems encountered. Replacement and/or repair of a chemical injection system or components, particularly downhole capillary lines, can be very costly not to mention the cost of any lost production. Specially formulated inhibitors and dispersants that are qualified for sub-sea and capillary use should be employed in these systems using recommended procedures and best practices for maintaining the integrity of the system. The integrity of umbilicals throughout the life of a field is crucial for maximum recovery without any lost production expenses.