

Ursachenanalyse und deren Lösung als Schlüssel zur dauerhaften OPEX-Reduktion - ein interdisziplinäres Fallbeispiel aus der Wasseraufbereitung des im UNESCO Weltnaturerbe Nationalpark Wattenmeer befindlichen Ölfeldes Mittelplate

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Abstract

Since 1987 the drilling and production island of Mittelplate operated by DEA Deutsche Erdoel AG with its non-operating partner Wintershall Holding has been producing more than 220 million bbl crude oil with no harm to the environment. The artificial island of Mittelplate is situated in the North Sea within the UNESCO World Heritage Waddensea national park. Because of its unique location strict governmental environmental requirements have been in place from the very beginning such as a closed water concept, zero discharge overboard and a ban on frac injection in addition to the prohibition of any extension of the artificial island.

Since the building of a pipeline to shore a part of the produced water is purified onshore and pumped back by plunger pumps to Mittelplate for reinjection into the reservoir. In the past the necessary plunger pumps ran continuously for 5 years. After hydraulic decoupling was implemented to increase the capacity, the life time of the pumps decreased down to 6 weeks only giving rise to severe cost and the potential of reduced oil production because of the above mentioned regulations. Resulting from an interdisciplinary root cause analysis comprising material science, chemistry and the production facility it was found that the damage was caused by cavitation of the plunger which resulted from a CO₂ release from the water which was caused by a change in the pressure regime of the production facility. Further examinations and considerations yielded in a well-thought-out modification of the pH-adjustment of the modified water purification process. At the same time all operational tasks are fulfilled such as securing that the pumps are not damaged and no scaling or bacterial activity is provoked which would negatively affect the water injection process. This way less chemicals are used as well as the OPEX, logistics and HSE balance are improved.