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Improving the Integrity of Crude Oil and Fuel Caverns.
The Workover Campaign in the Cavern Storage Field Blexen
in Northwest Germany

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Abstract

The storage field with 8 caverns and a total storage capacity of about 2 Mio. m^3 had been developed in the mid 70's of the last century. Like almost all completions at that time, there was no observable annulus to monitor the integrity of the last cemented casing. Due to regulations by the German Mining Authorities we have to inspect the caverns and we have to monitor the integrity of the wells.
So it was decided to install an additional casing string inside the 13 3/8" cemented casing with a packer.
The 13 3/8" casing was inspected with USIT, CBL and multi-finger tools as well as with intelligent magnetic flux pipeline pigs to get high resolution data of the STC connections
The production tubing had to decline from 8 5/8" to 7 5/8" diameter to fit into the additional 11 3/4" casing string.
To ensure the same production rates as before, the hydraulic system of pumps and electrical drives hat to be redesigned.
The quality of the stored petroleum must be analyzed once a year. Therefore, we installed 6 relief lines to take samples from different depths.

For monitoring the creep behavior of the overburden as the difference between subsidence at surface and lowering the roof of the cavern due to convergence, we decided to install several strain gauges at the surface casing below the starter head and at the 11 3/4" casing hanger.
Further on we developed new fire safe wellheads with integrated double barrier ball valves.

First results and lesson learned from three out of eight work over will be presented.

Key words: Caverns for Liquid Storage, Cavern Operation, Environmental Protection, Safety