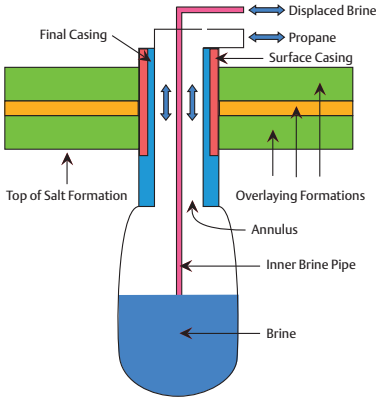
OIL AND GAS INDUSTRY

RELIABLE MEASUREMENTS AND IMPROVED SAFETY WITH MICRO MOTION FORK DENSITY METER



Salt cavern storage facility diagram

RESULTS

Reduced the number of manual density measurements, freeing up valuable resources

Improved safety by reducing the possibility of liquid propane overfill

Detected small changes in the brine density that would indicate small fractures in the brine fill/return pipework

Application

Salt caverns have proven to be both technically and economically feasible for storing hydrocarbon products for a number of years. They are essentially impermeable, meaning no fluid or gas can escape through the surrounding rock salt. This makes them ideal for storing high pressure hydrocarbon products.

Because hydrocarbon products are lighter than brine, they will float on top of the brine within the caverns. To inject products into the cavern, the products are pumped down the outer annulus of the pipe casings and the brine is displaced up and out of the inner brine pipe. The reverse operation brings product out of the cavern by pumping in the brine and retrieving out the product.

The application involves the measurement of brine out of an underground storage cavern which holds liquid propane.

Challenge

An energy company specializing in storage and transportation of natural gas have legal requirements to manually measure the density of the brine on a monthly basis to ensure that there is no propane present. Should any propane be present, the underground storage cavern would be closed immediately for safety reasons. Propane in the brine could occur due to an overfill of the cavern with propane, or due to small fractures in the inner brine pipe allowing propane to leak into the brine. In either instance, it could create a dangerous environment resulting in an explosion.

Due to the need to ensure the safe operation of the system, the operators typically take several manual brine density readings in addition to the monthly reading. This can be both costly and time consuming.

Solution

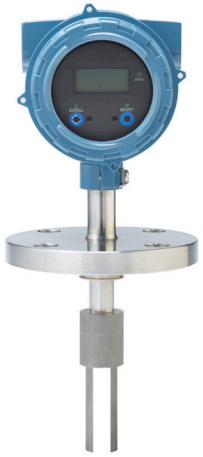
A Micro Motion direct insertion fork density meter was installed above ground on the brine pipework. The installation type was

AN-001469 Rev B

a 'TEE' piece arrangement. The advantage of this installation is that the existing pipework could be easily modified to accept the meter. There was no need to install the density meter in a bypass arrangement.

The meter's analog output was configured to give an output of specific gravity. This output was connected to the safety system at the customer's site. Typically brine has a specific gravity of 1.2 and propane has a specific gravity of 0.6. To detect any leaks into a faulty inner brine line, trip points for alarms are typically set to specific gravity of 1.15.

Also due to the large difference in the specific gravity values, the Micro Motion fork density meter easily detects the difference between brine and propane to trigger alarm conditions if an overfill of propane occurs. This minimizes the risk of a serious incident due to propane escaping into the atmosphere.



Micro Motion fork density meter (FDM)