

## Case study

# POLYFREE additive deactivated butadiene popcorn polymer in storage tank

A butadiene purification plant had an intermediate storage tank that began heating up. The plant personnel also noticed a popping noise coming from inside the tank. The existence of butadiene popcorn polymer was suspected. The plant began spraying water on the outside of the tank to try to cool it down. However, this did not stop the temperature increase. The problem generated serious health, safety, and environmental (HSE) concerns.

Plant personnel reached out to Baker Hughes to assess the situation, and together they devised a proper treatment plan for implementation. The tank was first evacuated of all butadiene. Once the entire volume of liquid hydrocarbon was removed, Baker Hughes pumped an aqueous popcorn deactivation solution using the POLYFREE™ popcorn polymer inhibitor into the tank to stop additional polymerization reactions and to deactivate the existent popcorn. The tank temperature began to stabilize quickly. Once the tank was determined to be safe for opening, the plant proceeded to remove the popcorn and linear butadiene polymer found within. Approximately 55 roll-off bins were removed.

Subsequent inspection of the equipment supported the theory that popcorn polymer growth started on the roof of the tank. Some of this polymer fell from the roof into the uninhibited butadiene and began polymerizing, which resulted in an exotherm that heated up the tank. With increasing temperature, reaction rates increased and uncontrolled polymerization began to occur. Close review of the system showed that a water wash system had been installed upstream of the butadiene storage tank, which removed all storage inhibitor.

The POLYFREE popcorn polymer inhibitor treatment successfully stopped further popcorn polymerization in the tank. As a result, a potentially significant hazardous incident was averted. The ability of POLYFREE inhibitor to deactivate the popcorn polymer permitted the plant to safely clean the tank and dispose of the material. To prevent this from occurring again, POLYFREE inhibitor is now added to the storage tank on a regular basis.

## Challenges

- High temperatures in intermediate storage tank
- Butadiene popcorn polymer was suspected present in the tank

## Results

- Deactivated the popcorn polymer to safely dispose of hazardous material
- Prevented further popcorn polymerization
- Significantly reduced related HSE concerns