Lewis Energy Group

Safety Alert

From the LEG HSE Department

Ice Plug

WHAT CAN HAPPEN?

Hydrates are a mixture of water and gas molecules that crystallize to form a solid "ice plug" under appropriate conditions of temperature and pressure. Hydrates can form from free water condensed in the gas stream at or below its water dew point. Hydrate formation will not occur if any one of the three required elements are altered: Pressure, Temperature, and Free Water.

Ice occurs with the simple chemical reaction of water changing state in response to temperature but hydrates are a bit more complicated. A hydrate is actually a hydrocarbon molecule (→ methane), trapped in a crystalline cage of water molecules. **The mass never becomes completely solid, is highly flammable, and resembles a dirty snowball.** The formation of a hydrate requires the presence of water, hydrocarbons, a drastic drop in temperature, and relatively high pressure. Thanks to the Joule-Thompson (JT) effect, the temperature of gasses and liquids can be significantly decreased when they are subjected to a sudden and drastic pressure drop. This expansion cools the gas through auto refrigeration, contributing to further growth of hydrates until normal flow is completely blocked. It doesn't need to be cold outside.

Some locations where hydrates occur are; pipelines, flow lines, well tubing and casing.

UNSAFE ACTS AND CONDITIONS: Once formed, hydrates pose a threat to people and equipment if not handled properly. The real hazard from hydrates comes from removing them. Proper procedures can prevent pipe, vessel ruptures and personal injury.

EXAMPLES OF POENTIAL ENCOUNTER: 1)Circulation systems 2)Anywhere you have a pressure drop or friction 3) Compressor cooler, discharge, dumps, suction line.

PREVENTION! DETER! DODGE! ANTICIPATE! AVOIDANCE! is the plan!

1) Determine safe shut-in periods for lines to avoid pressure build-up. Even insulated lines will not prevent the gas stream from cooling down to the hydrate range within hours in shut-in conditions. A safe shut-in time can be determined from temperature data gathered during short shut-in periods

2) Introduce chemical inhibitors (methanol and/or glycol)

3) Always assume that an ice plug in a piping system will contain trapped

4) When operations that involve an ice plug, STOP the task and report the condition to your Foreman/Supervisor. DO NOT PROCEED WITH THE TASK UNTIL AUTHORIZED

5) When functioning gate style valves, ensure the number of turns to open/close are known; The proper number of turns can confirm that the valve is closed.

6) Always ensure that a site specific assessment is completed, to determine a safe course of action and the control measures required to mitigate the out of scope conditions