

FMECA worksheet template

Functions and components	Description of failure		Barriers	Consequences	Cr	Suggested risk reducing actions and remarks
	Failure mode	Failure causes				
<p>Close GLV</p> <p>Operational phase: - Operation</p> <p>GLV: - Valve stem - Housing - Poppet - Spring - Orifice</p> <p>GLV interfaces: - SPM</p>	Partly closed valve	<p>22. Sulphide stress cracking (SSC) of the spring</p> <p>Failure cause category: - Component failure by operational conditions</p> <p>Load scenarios: - Normal gas injection - Shut-in</p> <p>Operational conditions (shut-in): - Condense water (pH 4.5) - 100°C - 10 000 psi - ppH2S = 5 bar - High shear stresses (not tension) - Cooling effect from flow throttling through the valve</p> <p>Other influencing factors: - Spring material</p> <p>Existing cause reducing actions: - Spring made of MP35N (cobalt) - Normally dry gas environment</p>	<p>Detection (how): - Increased pressure will be detected in A-annulus (continuously recorded)</p> <p>Detection (when): - The leakage will be detected when the A-annulus pressure is drained after GLV closure</p> <p>- Leakage will be detected no later than the periodical testing of the primary well barrier.</p> <p>Existing consequence reducing actions: - Activate the ASV or the wellhead safety system</p>	<p>Worst case consequence: - The GLV failure is combined with failure of all secondary well barrier elements. The topside lift gas pipe line may now be exposed to reservoir fluids. If the lift gas pipeline is broken by an external hazard, there will be a blowout through annulus (accidental event).</p> <p>Most probable consequence: - The initial A-annulus pressure will be higher than the completion string pressure, but gradually be reduced as the A-annulus gas is flowing into the completion string through the GLV. A dart not fully closed with equal pressure in A-annulus and the completion string should not be considered as any additional risk (pressure control).</p> <p>- If not closing when having reduced pressure in A-annulus, the GLV as a primary well barrier has failed and the secondary well barrier will be active.</p> <p>- Replace the valve if valve leakage during periodical testing is outside acceptance criteria</p>	A	<p><u>Suggested cause reducing actions</u> - None</p> <p><u>Suggested consequence reducing actions</u> - None</p> <p><u>Remarks</u> - MP35N (UNS R30035), in the cold worked and aged hardened condition as specified in ISO 15156-3, is approved as a spring material up to 55HRC for all well conditions.</p> <p>- The GLV is considered as a primary well barrier.</p> <p>- The secondary well barrier will be the ASV if installed. If not, the secondary well barrier will be the AMV.</p>