Insulation Failure on a Cryogenic Propane Tank

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ABSTRACT

In June 2010, a failure was experienced of the insulation system on a 23,000 Tonne cryogenic propane storage tank in the UK (Operating at -40°C and 35mbarg). Over a 1 week period, the tank suffered a catastrophic deterioration of its insulation system; with up to 60% of the insulation collapsing exposing the tank shell. A formal investigation was conducted to determine the root causes of this failure; and to generate corrective actions to prevent recurrence. One of the major findings relates to the propensity of cellular glass type insulation materials to absorb water; which can then be subject to a deteriorating freeze/thaw mechanism over time, as both tank level and ambient temperatures change. Recommendations from the investigation include ensuring that cladding replacement strategies consider multiple selection criteria, such as: weather protection, vapour barrier capability, prevention of freeze-thaw mechanisms of the insulation fabric, structural integrity (including potential to provide additional support to insulation system) and fire protection benefit (pressure relief considerations).

David Bleakley is Chief Safety Engineer for ConocoPhillips Norway and led the Root Cause Analysis Investigation team. David possesses a Bachelors and Masters in Chemical Engineering from UMIST; and has over 14 years experience of working in the Chemical and Oil & Gas Sector.