This abstract will be presented during LNG2023 conference on 10-13 July in Vancouver, Canada among many other innovative projects, ideas and outlooks. LNG2023 will provide a unique platform for the global LNG industry and key stakeholders to discuss, debate, and showcase the latest industry developments and opportunities.

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ADVANCING FREEZE-OUT PREDICTIONS FOR MORE RELIABLE LNG PRODUCTION

Impurities present in the feed gas to LNG plants can form solids and block cryogenic heat exchangers, even at trace concentrations. Remediating blockages caused by impurity solidification is expensive and potentially hazardous. The range of problematic compounds at risk of freeze-out includes heavy hydrocarbons, BTEX, sulfur-containing species, CO2 and H2O. Interactions between impurities can mean that a minor, temporary operational upset can lead, unexpectedly, to blockage formation several months later. Experience within the United States has shown that trace impurities in lean feed gas for LNG facilities pose a significant operational risk of impurity freeze-out in gas treatment and liquefaction facilities. Conventional tools for predicting the freeze-out risk are of limited use and accuracy.

Advanced experimental techniques and new data for multiple solids are presented here and compared with predictions generated using existing models for impurity freeze-out in LNG production. High-resolution measurements of phase equilibrium and solid formation kinetics have been made for mixtures of methane and benzene, water, or CO2 at concentrations from (5 to 500) ppm. In collaboration with the GPA Midstream Association and the Future Energy Exports CRC, these measurements are now being extended to target mixtures with sulfur-containing species such as H2S and odorants. This new data will be used to improve engineering tools for predicting these phenomena.