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Abstract

A feasibility studies via technology screening exercise was conducted to find an integrated offshore solution for a gas field with high amount of total mercury particularly on particulate-bound mercury concentration in the gas, condensate and produced water. High mercury content would impact the topside facilities, pipeline and terminal, imposed a high HSE risk towards personnel and environment as well as giving impact on sales gas specifications. Conventional available technology can only remove elemental mercury for single phase only.

The mercury speciation report based on sampling analysis from the production well indicated a high content of particulate mercury up to 48,000 ppb with considerable amount of elemental mercury of 1500 ppb. An integrated solution which can handle multi-phase stream focusing on particulate mercury is required considering space limitation issue at the facilities being a satellite platform.

The screening process involved submission of technology inquiry to technology vendors in order to identify commercial and emerging technology to mainly remove particulate-bound mercury and elemental mercury while having improvement in terms of weight, footprint, cost and operation for offshore platform. Other aspects being considered including their tolerance limit towards contaminants, adsorbent bed life, technology readiness level (TRL), phases of feed stream and ease of operation.

The proposed technology is required to meet the target mercury specifications at the outlet stream based on the sales and disposal requirement.

Readily commercialized technology and in pilot testing for offshore application focus on removal of elemental and particulate-bound type of mercury species. For adsorption bed, due to its limitation towards contaminants, pre and post treatment is required as part of the mercury removal system.

Readily available technology for mercury removal is limited to ‘single’ phase (gas or liquid only) to remove elemental mercury via adsorption bed using metal oxide/sulphide. At this point of time, there is no available adsorbent in the market for mercury removal in produced water stream. Other available technology is either not well established or too expensive for offshore application. For particulate-bound mercury, typical removal is via filters which required frequent maintenance due to clogging from high mercury solid content.

Cyclonic technology which uses the centrifugal force and density difference between the solids and liquid stream is considered as emerging technology to remove particulate-bound mercury. It can be located at

full wellstream or immediately downstream of choke valve. Cyclonic technology demonstrates the following criteria i.e. 1) no limitation in terms of handling contaminants 2) required minimum maintenance 3) small footprint 4) minimum HSE risk and exposure towards personnel as solid removal via seal container 5) able to handle either single phase or multiphase streams. Thus, it can be considered as an attractive solution.

This paper describes technology screening exercise to find solutions focusing to remove particulate-bound mercury for existing and future offshore production field with improvement in terms of technical and commercial perspective.