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Abstract

Failure Investigation of Sea Water Transmission Pipeline

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Abstract:

A 13-km internally-coated water transmission pipeline has experienced repetitive leaks failures at 8-10 KM locations. A scraping operation was performed with a foam scraper, followed by two cleaning scrapers. Water, deposits, and sludge were collected at various stages of scraping and analyzed to determine the potential root cause of failures. The foam scraper was only removing loose deposits in the pipeline. The X-Ray Diffraction (XRD) analysis indicated that the top layer of the deposits consisted of 50% sand and 47% calcium carbonate. The cleaning scraper showed an effective removal of denser deposits. XRD analysis of deposits after second and third cleaning scraper detected up to 98% sand or 100% elemental sulfur. Moderate number of general bacteria and corrosion-causing sulfate-reducing bacteria (SRB) were detected in both water and solid deposits samples. High-throughput sequencing of 16S rRNA genes from water and sludge samples revealed the presence of bacterial families Rhodobacteraceae, Alteromonadaceae, Flavobacteriaceae, Planctomycetaceae, Rhodospirillaceae, Desulfobacteraceae and Piscirickettsiaceae. In conclusion, the sand deposits, presence of elemental sulfur in the deposits, and moderate number of corrosive SRB might be major contributing factors for the repetitive failures of the pipeline. Further investigation in sand source, elemental sulfur source, coating integrity, and microbial activity in this pipeline is required to determine the root cause of the failures and maintain the pipeline integrity.

Biography:

Sarah A. Al-Aqeel has completed her PhD from King Abdullah University of Science and Technology (KAUST) in Chemical and Biological Engineering. During her study

at KAUST, she served as a key investigator and focused on a system wide approach to identify a mechanism of Biofouling attachment, toward the discovery of antifouling compounds. She joined Saudi Aramco as a research scientist. Sarah's work focus on finding a solution to prvent the negative impact of uncontolled biofilm growth in oilfeild systems.

Publication of speakers:

1. Al-Aqeel S, Ryu T, Zhang H, Chandramouli KH and Ravasi T (2016) Transcriptome and Proteome Studies Reveal Candidate Attachment Genes during the Development of the Barnacle Amphibalanus Amphitrite. Front. Mar. Sci. 3:171. doi: 10.3389/fmars.2016.00171

2. Al-Aqeel S, Ryu T, Zhang H, Chandramouli KH and Ravasi T (2016) Transcriptome and Proteome Studies Reveal Candidate Attachment Genes during the Development of the Barnacle Amphibalanus Amphitrite. Front. Mar. Sci. 3:171. doi: 10.3389/fmars.2016.00171

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