Maximize the Value of Thermal Facility Water Treatment Plant Strategy for Lower Cost & Lower GHG


Abstract

Objectives/Scope: Petroleum Development Oman LLC (PDO) is Oman’s premier oil producer and operates several fields at “A”. “A” East and “A” West are located on the eastern flank of the South Oman Salt Basin. Thermal Enhanced Oil Recovery application in Oman has been first operated in Gulf region back in 2012 with enormous lesson learnt insights on selecting and operating water treatment facilities. Quality of water treatment plant (WTP) of steam generation boilers is very important to prevent corrosion, scale formation, as a result in all stages of steam generation. This has significant concerns encountered on safety, economy, and reliability. However, reaching water producing target of 30k m3/day has come with huge annual Opex cost of >$6mln annually from chemical treatment, ion exchange operation challenges and maintenance of unit. The water treatment unit in EOR fields in PDO has gone through detailed study across flow assurance modeling exercise, new chemical for first time in industry to assist the treatment process and detailed benchmarking and selection water treatment process selection study.

Methods, Procedures, Process: In This project, different approaches and process had been used such as lean practice including process mapping, practical problem solving, visual management boards, Kaizen approach used also to define the opportunities and develop the countermeasures. Process Control and Process Optimization approach (PACO) used to assess the existing system optimization and set values validation. Production System Optimization (PSO) used to identify all possible opportunities.

Results, Observations, Conclusions: This paper has led to significant economic benefits of cost savings around $5mn/year from overdesigning the facility for new fields development and through optimizing the existing unit. Also, there is an additional benefit gained through out of box solution to enhance the WTP capacity. It resulted in below benefits (confirmed): 1-GHG Reduction of 4,600 TCo2e/yr due to reduction of blanketing gas in WTP soft water tank and avoidance of power consumptions for the additional water produced. 2-An oil secure of 390 m3/d from Amal fields due to securing the required soft water for steam injection. 3-An oil gain of average of 30 m3/d due to potential of project acceleration because of high availability of soft water. 4-A cost saving of more than 4.7 mln$ due to cancelation of other project to cater for water shortage.

Novel/Additive Information: Novel and out of box approaches developed in-house with experience within operation and function teams, allowing all steam generators to be integrated along with WTP that will allow smooth and high availability of steam system/network and therefore reducing the energy intensity and secure the EOR requirements.