Estimating fouling and hydraulic debottlenecking of a clarifier piping system in an industrial expansion

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Abstract

Debottlenecking and estimating fouling in a clarifier piping system was analyzed and modified. The existing clarifier piping system fitting data was gathered for the real-world operation from the field. This data was used in Applied Flow Technology (AFT). The two piping roughness factor cases tested were roughness of 0.0005 ft and fouling of 1 inch. The AFT Fathom results showed that without piping modifications and specifying fouling of 1 inch, flow cannot be established due to insufficient driving force for liquid movement. The measured field flow data confirmed that the reduced clarifier capacity was due to high pressure losses in the system. It was found that the existing clarifier nozzle was inadequately designed originally, and replacing the nozzle showed an increase in the clarifier capacity due to reduced air entrainment. These modifications were further adapted in the plant expansion and operations were validated using the actual plant data.

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