Application of NF Membranes to Rebuffer Alkalinity in Treated Water for a Produced Water Treatment Process

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Abstract:

Alkalinity in the raw water, sourced from the ground, at a Company's water treatment plant was reducing over the course of 2021 with trend expected to continue. The treatment process included reverse osmosis. Due to the decreased influent alkalinity, the alkalinity present in the permeate was below the level required for discharge. Several options were previously investigated by the operations team with a bleed of the blending of the feed with the permeate providing a temporary solution. If the raw water alkalinity continued to decrease, this solution would no longer be viable as the site would exceed the upper limit of chloride concentration in their discharged water. The implementation of a nanofiltration stage prior to reverse osmosis was investigated. The intent was to create a stream that was relatively high in alkalinity compared to chloride. This stream could be blended with the reverse osmosis permeate to maintain a high enough level of alkalinity and a low enough level of chloride to meet discharge requirements. Modelling was conducted on process streams to determine deportment of compounds and blending scenarios were investigated. Nanofiltration plant pricing was obtained and the process was compared to the base case scenario of lime addition to the treated water.

Keywords: Nanofiltration, NF applications, produced water, alkalinity