Maintenance Project Case Study

Sour Water Hydraulic Study

Detailed Hydraulic Analysis

A Midwest refinery client was replacing sections of sour water collection piping as part of an ongoing piping replacement project and had decided to upsize a section of the collection header to improve flow. This decision was based on the observation that some contributors to the collection system were being “backed out” hydraulically due to high pressure drop during periods of high sour water flow. The client requested that Brindley Engineering perform a detailed hydraulic analysis to confirm that the decision to upsize the piping would assist in alleviating the observed problems, while at the same time ensuring that other elements within the system, especially control valves, were not adversely affected.

BE the Solution

Brindley Engineering’s Process department reviewed the overall collection system P&IDs and worked with the client to provide a cost-effective solution to this hydraulic concern. The collection system included sour water sources from numerous units within the refinery, covering a large geographical area. Hence, rather than model the entire system, involving a comprehensive field walkdown of all piping within the system, it was suggested that the portion of the piping being replaced was hydraulically modeled utilizing both the current size and the future (proposed) size to determine a predicted gain from the reduced pressure drop. This hydraulic model was built using Korf Hydraulics, a hydraulic modeling software.

Based on all other elements of the system remained unchanged, the calculated pressure drop was then applied to all control valves within the collection system. Data was collected for each control valve and each was then modeled using Korf Hydraulics to determine if the valve was still working within a controllable range.

Our Challenges

Tight operating parameters, a large / complicated system with multiple input points, numerous control valves to account for, and little data to start from made this a challenging study.

BE the Result

Results from this hydraulic study and analysis of the control valves showed that no control valve was adversely affected by the gain in pressure drop. However, one control valve was identified as being oversized in both current and future modes of operation and required further investigation.

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