



STRENGTHENING LARGE INDUSTRIAL FIREWATER SYSTEM

TARGETING RISK REDUCTION IN A COMPLEX, AGING FIREWATER SYSTEM

DATA-DRIVEN MODELING IDENTIFIED CRITICAL DEFICIENCIES, PRIORITIZED UPGRADES, AND IMPROVED SYSTEM RELIABILITY

A Gulf Coast refinery initiated an annual investment program to address deficiencies in its aging firewater system and reduce overall asset risk. As one of the largest refineries in the U.S., the size and complexity of the network made it difficult to confidently prioritize improvements. To ensure investments were targeted and effective, the site engaged Hydrus Works to develop a clear, data-driven understanding of system performance.

CHALLENGE

The refinery's firewater system had evolved over decades through multiple expansions, resulting in a large and highly complex network. The system included varying pipe materials, changing design standards, and three independent pump stations with unique configurations and operating conditions.

With limited visibility into system performance under fire scenarios, the site faced uncertainty in identifying where deficiencies existed and how best to prioritize capital improvements.

SOLUTION

Hydrus Works developed a comprehensive hydraulic simulation model of the firewater system using a rigorous, data-driven approach. High-flow, cross-site testing was conducted to collect pressure and flow data, which was combined with operational data and field observations to calibrate the model within 5% of measured conditions.

The calibrated model was used to simulate multiple fire scenarios across the site, providing clear visibility into system performance and identifying areas where firewater demand could not be met.

RESULTS

The analysis identified high-risk areas and uncovered previously undetected system deficiencies. Hydrus Works evaluated targeted upgrade options for each location, providing data-backed solutions that improved system performance and reliability.

The recommended improvements addressed:

- Firewater shortfalls,
- Increased system redundancy
- Reduced long-term fouling risk, and
- Enhanced overall operational reliability.

In addition, the site gained a centralized, user-friendly tool to support ongoing system evaluation and future planning.

Data-driven modeling identified critical firewater deficiencies, prioritized targeted upgrades, and improved system reliability for long-term asset protection.