THE
FIRE PROTECTION
RESEARCH FOUNDATION

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Fire Pump Field Data Collection And Analysis Project
Aon FPE Project No. 1811001-000

Executive Summary

Moving towards performance based codes and standards require better quantification so that performance can be measured with a reasonable level of confidence. This project was conceptualized to utilize current technology including the internet to identify, collect and analyze
available data to validate testing frequency for fire pumps. In addition this project was to develop protocols and tools that could be extended to address issues that require longer term data collection for validation.

NFPA 25 currently requires annual performance testing of fire pumps. In a performance test water is discharged and the net performance of the fire pump is analyzed through a minimum of three flow points. NFPA 25 also requires non-flow testing of fire pumps, were the fire pump is started and run for a time interval under churn conditions. Currently weekly non-flow tests are required for diesel fire pumps and monthly non-flow tests are required for electric fire pumps. The non-flow test frequency remains an item that is debated during every NFPA 25 code cycle.

The following questions based on the original project scope and Technical Panel guidance were formulated to provide additional focus to the project.
    A. What is the appropriate test frequency for non-flow testing of electric and diesel fire pumps?
    B. How well and how frequently the tests provide evidence of existing or developing problems?
    C. What unknown or inadequately defined issues can be improved with systematic data collection? Issues identified in the RFP included (but were not limited to).
        1. Limited service controller reliability;
        2. Variable speed pressure limiting pumps reliability (Pressure relief valves on variable speed fire pumps because of a lack of experience); and,
        3. Unforeseen failure modes that may occur with new technology, product redesign, and manufacturing changes

Collecting, correlating, and entering existing paper test records into a standardized electronic format for analysis is extremely time consuming, so the project was focused on available data that was already in electronic format. Performance fire pump testing requires analysis that makes entering the original test data into a spreadsheet or data base more efficient than manual analysis, and a significant part of the industry now collects this information electronically. Non-flow fire pump testing only requires a record that the test was conducted and could be a checkmark(s) on a paper form or checklist. While some large firms with multiple locations and some pump test companies maintain electronic records, a significant portion of these records are maintained on paper.

Non-Flow Data Collection: To collect non-flow test data for this project, a standardized Non-Flow Pump Test Data Collection Form was developed and provided to the Technical Panel members who solicited input from their various plant locations. Standardized failure modes were included on the data collection form. The initial form which provided only a Pass / Fail option was later modified to provide Pass / Repair / Fail Option. Five companies provided a total of 32 data sets with 3396 non-flow tests on 79 fire pumps using the Pass / Fail only forms. A total of 112 failures were reported in these tests. One company provided a total of 6 data sets with 749 non-flow tests on 17 fire pumps using the Pass / Repair / Fail forms. A total of 20 pumps needing repairs and 29 failures were reported in these tests. Comments regarding maintenance issues that do not directly affect the fire pump starting and operating were recoded on 122 tests.
One company provided electronic records in a different format on 983 tests on 41 fire pumps. A total of 103 tests identified repairs were needed, and 11 failures were reported.