

4.3 Troubleshooting in Pumping Facilities

Pumping stations are very important components in a stormwater drainage system. Pumping equipment is subjected to wear, tear, erosion and corrosion due to their nature of functioning and therefore is vulnerable for failures. Sudden failures can be avoided by timely inspection, follow up actions on observations of inspection and planned periodical maintenance. Downtime can be reduced by maintaining inventory of fast moving spare parts. Efficiency of pumping equipment reduces due to normal wear and tear. Timely action for restoration of efficiency can keep energy bill within reasonable optimum limit. Proper record keeping is also very important. Due attention needs to be paid to all such aspects for efficient and reliable functioning of pumping machinery.

4.4 Type of Failure

Failure is the cessation of proper function or performance. RCM discussed in Section 3.5 examines failure at several levels: the systems level, subsystem level, component level, and sometimes even the parts level.

The maintenance approach shall be based on a clear understanding of the consequences of failure at each level. For example, a failed lamp on a control panel may have little effect on overall system performance; however, several combined, minor components in degraded conditions could collectively cause a failure of the entire system.

Failure modes are equipment and component specific failures that result in the functional failure system or subsystem. For example, a machinery train composed of a motor and pump can fail catastrophically due to the complete failure of the windings, bearings, shaft, impeller, controller, or seals. In addition, a functional failure also occurs if the pump performance degrades such that there is insufficient discharge pressure or flow to meet operating requirements. These operational requirements should be considered when developing maintenance tasks.

Dominant failure modes are those failure modes responsible for a significant proportion of all the failures of the item. They are the most common modes of failure. Not all failure modes or causes warrant preventive or conditioned based maintenance because the likelihood of their occurring is remote or their effect is inconsequential.

4.4.1 Failure Identification

The proactive approach to maintenance analysis identifies potential system failures and ways to prevent them. It, along with human observations during normal operations or maintenance tasks, also identifies pre-failure conditions that indicate when a failure is imminent. The latter is a basis for selecting PT&I applications. The Contractor's CMMS and work order form should include fields for failure codes in order to maintain historical data.

4.4.2 Identify the Consequences of Failure

The most important consequence of failure is a threat to safety. Next is a threat to the environment or mission accomplishment (operating capability). The RCM analysis should pay close attention to the consequences of the failure of infrequently used, off-line equipment and hidden function failures. Also, it should consider the benefit (reduced consequences of a failure) of redundant systems.