ASSESSING THE RISKS OF UNPROTECTED CAST IRON SEWER RISING MAINS

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EXECUTIVE SUMMARY

What pipelines should I replace? How much of it needs to be replaced? When should I replace it? These are fundamental questions water authorities are faced with, along with financial constraints and tight regulatory service requirements.

South East Water Limited, one of the three retail water companies servicing the Melbourne metropolitan area, is utilising an approach for its unprotected metallic sewage pressure pipelines (rising mains), which addresses these questions. This approach is based on sound engineering principles and uses data obtained at a comparatively low cost. The methodology involves a pro-active investigation to establish the likelihood (or probability) of failure and the establishment of the consequences of a failure of the water company's unprotected cast iron sewer rising mains.
Those sewer rising mains without a failure history, are investigated using a technique provided by Tyco Water known as "EnviroStat". This is where a combination of linear polarisation resistance (LPR) soil testing, extreme value statistics (EVS) and pipeline failure algorithms are used to produce an estimate of the time-to-first failure and probability of failure of the investigated sewage rising main.

The LPR process was originally developed in the USA to determine the condition of buried steel culverts, and was further modified by Sydney University and Tubemakers in the mid 1980's. It is an electrochemical technique, which is applied to soil samples taken from close proximity to the pipeline and determines the polarisation resistance (R_p) of a steel/cast iron electrode in contact with the soil. In an initial trial in 1998 the prediction of failures using the LPR and EVS technique successfully matched the recorded failure histories on approximately 82% of the pipelines investigated.

The consequences of failure of a main are determined by considering a number of factors including the impact on the environment and customers, the cost of repair, etc. This 'number' is then multiplied by the probability of failure to establish the criticality, or 'risk' for the particular sewage rising main. Mains are then placed in descending order of criticality and the estimate of time-to-failure and/or probability of failure allows input into a future capital expenditure program.

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