CONDITION ASSESSMENT OF CAST IRON AND ASBESTOS CEMENT PIPES BY IN-PIPE PROBES AND SELECTIVE SAMPLING FOR ESTIMATION OF REMAINING LIFE

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ABSTRACT

In the climate of economic rationalisation and benchmarking of service delivery indices, water authorities require proactive maintenance to remain competitive within the constraints of regulatory compliance. Whilst trenchless rehabilitation is essential to deliver these outcomes, the ability to map the condition and estimate remaining life of pipelines is a key prerequisite. This paper discusses the research and development of tools that are necessary to apply condition assessment to cast iron and asbestos-cement pipelines, which comprise the majority of Australian water distribution networks. In many cases, these pipes are past or rapidly approaching their design life. Characterisation of pipe wall properties and surrounding soil strata is the minimum requirement for pipeline condition assessment and estimation of remaining life. One technique currently being optimised that allows assessment of some of these critical properties is a Remote Field Eddy Current (RFEC) tool, which is applied for wall thickness measurements in cast iron pipe. Other methods for wall thickness assessment of metallic and cementitious pipes are based on transient electromagnetic (TEM) concepts, electron probes and moisture density probes. These techniques are also being developed and evaluated as to their suitability in assessing both pipe wall and embedment condition. To allow the full use of wall condition information, models are being constructed relating failure probability to residual wall thickness, operating pressure, and soil loading stresses. A more direct approach being developed for obtaining data for condition assessment of pipe wall and soil bedding is ‘keyhole’ sampling. This method is particularly useful for cementitious pipes where the success of electromagnetic methods is limited. In conjunction with a model based on residual pipe strength, keyhole sampling has allowed failure prediction of cementitious pipes under various operating and installation conditions.

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