Condition Assessment and Diagnosis for Aging Drinking Water Pipeline According to Scientific and Reasonable Methods

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Abstract : In public water facilities, drinking water distribution systems have played an important role along with water purification systems. The water distribution network is one of the most expensive components of water supply infrastructure systems. To improve the reliability for the drinking rate of tap water, advanced water treatment processes such as granular activated carbon and membrane filtration were used by water service providers in Korea. But, distrust of the people for tap water are still. Therefore, accurate diagnosis and condition assessment for water pipelines are required to supply the clean water. The internal corrosion of water pipe has increased as time passed. Also, the cross-sectional areas in pipe are reduced by the rust, deposits and tubercles. It is the water supply ability decreases as the increase of hydraulic pump capacity is required to supply an amount of water, such as the initial condition. If not, the poor area of water supply will be occurred by the decrease of water pressure. In order to solve these problems, water managers and engineers should be always checked for the current status of the water pipe, such as water leakage and damage of pipe. If problems occur, it should be able to respond rapidly and make an accurate estimate. In Korea, replacement and rehabilitation of aging drinking water pipes are carried out based on the circumstances of simply buried years. So, water distribution system management may not consider the entire water pipeline network. The long-term design and upgrading of a water distribution network should address economic, social, environmental, health, hydraulic, and other technical issues. This is a multi-objective problem with a high level of complexity. In this study, the thickness of the old water pipes, corrosion levels of the inner and outer surface for water pipes, basic data research (i.e. pipe types, buried years, accident record, embedded environment, etc.), specific resistance of soil, ultimate tensile strength and elongation of metal pipes, samples characteristics, and chemical composition analysis were performed about aging drinking water pipes. Samples of water pipes used in this study were cement mortar lining ductile cast iron pipe (CML-DCIP, diameter 100mm) and epoxy lining steel pipe (diameter 65 and 50mm). Buried years of CML-DCIP and epoxy lining steel pipe were respectively 32 and 23 years. The area of embedded environment was marine reclamation zone since 1940's. The result of this study was that CML-DCIP needed replacement and epoxy lining steel pipe was still useful.

Keywords : drinking water distribution system, water supply, replacement, rehabilitation, water pipe

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