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Negative pressures in full-scale distribution system: field investigation, modelling, estimation of intrusion volumes and risk for public health

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Abstract. Various investigations encompassing microbial characterization of external sources of contamination (soil and trenchwater surrounding water mains, flooded air-valve vaults), field pressure monitoring, and hydraulic and transient analyses were conducted in the same distribution system where two epidemiological studies showing an increase in gastrointestinal illness for people drinking tap water were conducted in the 1990's. Interesting results include the detection of microorganisms indicators of fecal contamination in all external sources investigated but at a higher frequency in the water from flooded air-valve vaults, and the recording of 18 negative pressure events in the distribution system during a 17-month monitoring period. Transient analysis of this large and complex distribution system was challenging and highlighted the need to consider field pressure data in the process.

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