## SEMINAL 1994 ARTICLE BY JOHN MAY - PRESSURE DEPENDENT LEAKAGE

## The Fixed and Expanding Leakage Paths Concept

In October 1994, a one-page article by John May appeared in the October issue of World Water and Environmental Engineering. This seminal article proved to be a step change in explaining why leak flow rates in distribution systems were generally more sensitive to changes in pressure than predicted by Torricelli's



John Henry May 24.06.1951-06.03.2012

equation, that velocity of flow through an orifice varied with the square root of pressure.

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The concept proposed by John, that the area of some leakage paths varies linearly with pressure, resulting in leak flow rates more sensitive to changes in pressure, has over the last 22 years revolutionised the international approach to understanding and predicting pressure:leak flow relationships. Prior to 1994, leakage engineers and practitioners, mainly in the UK and Japan, were aware that these relationships varied significantly from system to system but were unable to satisfactorily explain why. John's FAVAD concept based on fixed and variable leakage paths has since been validated (Van Zyl et al, 2017) by detailed research since 2000 by Professor Kobus van Zyl (now at University of Auckland) and colleagues. I have mainly worked with, and promoted, practical applications of the N1 power law, FAVAD and component analysis.

Additional data which John briefly published in 1994, showing the influence of pressure on burst frequency, stimulated my own intense interest in these topics since 1994. Between 1994 and 2009 I had the pleasure of many technical discussions on these concepts and their application with John, and I promoted his ideas around the world as a friend and colleague. He was a quite brilliant person, often controversial, who always challenged and stimulated others to think more deeply about the things we didn't understand, rather than to accept too readily the conventional wisdom that is so often in need of improvement.

John was one of the true pioneers of leakage management through pressure management, until his death from motor neurone disease in 2012. His early ideas and guidance provided a firm foundation for the development of the concepts most international leakage practitioners now use. Without his seminal 1994 article, and his insight and inspiration, I believe we would now not be much further forward than we were prior to the original appearance of his article.

## Allan Lambert, 16th April 2021

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Van Zyl, J.E., Lambert, A., and Collins, R. (2017). "Realistic modeling of leakage and intrusion flows through leak openings in pipes." Journal of Hydraulic Engineering, 143(9) 1-7. https://doi.org/10.1061/(ASCE)HY.1943-7900.0001346