**PRESMAC**

**Pressure Management Program (PRESMAC)**

PRESMAC User Guide Version 1.1. Development of a pragmatic approach to evaluate the potential savings from pressure management in potable water distribution systems in South Africa, by Ronnie McKenzie. WRC Report TT 152/01

**Background**

In the continual battle to reduce leakage from potable water distribution systems, the influence of pressure is often overlooked. Planners design potable water distribution systems to provide a certain minimum level of service throughout the day at the most critical point in the system. The critical point is generally either the highest point in the system or the point most distant from the source, although it may be a combination of the two depending upon local topography.

The pressure at the critical point will depend upon the pressure at the inlet point minus the friction loss occurring between the inlet and the critical points. Friction loss will be highest during periods of peak demand. Since the systems are designed to supply the minimum level of pressure at the critical point during peak demand periods, the pressure will increase during periods of low demand. The pressures in potable water distribution systems are therefore significantly higher than required much of the time, particularly during the night when demand is low. Since losses and leakage from a system are highly dependent upon pressure, leakage rates are therefore also highest during periods of low demand.

Various techniques and equipment have been created to control pressure and thus, reduce leakage in water distribution systems. In the UK, water suppliers adopted a straightforward and pragmatic approach to the control of leakage levels, resulting in the development of various techniques that became known as the Burst and Background Estimate (BABE) procedures. Although pressure management software developed in the UK is available commercially, it is not designed specifically for South African conditions.

To overcome these problems, and as part of a greater strategy to promote water conservation, the Water Research Commission initiated a project to develop a South African pressure management model (PRESMAC). This model is based on the BABE principles, but was modified to suit local conditions where necessary.

The PRESMAC pressure management model is used to assess the likely savings (in monetary terms) if various pressure reduction options (fixed-outlet and time-modulated PRV’s) in a selected zone metered area. The analysis is undertaken in a relatively simple and pragmatic manner based on the general BABE concepts. This approach allows the user of the program to gauge the potential for pressure management very quickly and effectively without requiring a full detailed pipe network analysis. Although the methodology is based on a number of simplifications and assumptions, in practice, the predicted savings are generally within 10% to 20% of those actually achieved (erring on the conservative side).

**Using PRESMAC**

The PRESMAC model allows the user to analyse the existing situation in a any specific pressure management area. It then allows the user to assess the likely savings that can be achieved through the installation of a new PRV or by re-setting an existing PRV to a lower pressure. Finally, the model allows the user to assess the potential savings that can be achieved through the use of a time-modulated controller. The time-modulated controller is the simplest, least expensive and most widely used controller available. It is already in use in many parts of South Africa having been introduced to the country at the beginning of 1999.

It should be noted that the model in its current form does not accommodate the analysis of the more complicated and expensive flow-modulated controller, although this option may be added at some future date. In most cases, the analysis of the time-modulated controller will provide the required motivation for the purchase and installation of any form of advanced pressure control. If it is found that the time-modulated controller can be justified on sound financial grounds, then it is likely that the flow-modulated controller will provide even greater savings.